Climate Change
Achieving Our Commitments Together

Climate Change Plan for Canada

Government of Canada | Gouvernement du Canada

Canada

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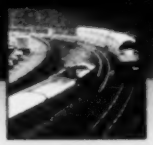

Preface

There are few things more fundamental to Canadians than the rich natural legacy we have inherited. Canadians understand the importance of the environment, both to the quality of life we enjoy and to our future economic progress.

There is also clear recognition that certain activities are having a harmful effect on the environment and that the choices we make today can determine the health of our environment – not only for tomorrow or next year, but 100 years from now.

One of the most pressing environmental challenges is that of global warming. The international scientific community has concluded that the rapid increase in the concentration of greenhouse gas emissions in the atmosphere can be expected to increase the earth's surface temperature, change our climate, alter our environment and endanger our health.

No one country, acting alone, can solve the problem of climate change, but by working together towards a common goal, the nations of the world can successfully address this challenge.

That is why, in 1992, Canada supported the United Nations Framework Convention on Climate Change. Since then, the Government has announced its intention to ratify the Kyoto Protocol, which sets out specific targets for reducing greenhouse gas emissions.

It is vital to have a plan that will enable Canada to successfully meet its climate change objectives. The initiatives included in the *Climate Change Plan for Canada* will do that.

Moreover, they reflect the priorities identified through the extensive consultations that have taken place with provincial and territorial governments, municipalities, industry representatives, non-governmental organizations and individual Canadians over a number of years.

The Government of Canada is committed to continuing that collaboration in an effort to find the most effective ways to build on the proposals presented in the Plan.

Participating in the global effort to address climate change is an issue for all Canadians in every region and every walk of life. Indeed, it will require a national effort, one that summons the best from our citizens, entrepreneurs, scientists, communities and governments.

Our vision is anchored in our past successes and builds on our current strengths. It is a vision of a responsible, innovative, energy-efficient society with long experience as a leading producer of energy.

This Plan strikes the balance needed to enable our economy to flourish even as we reduce our greenhouse gas emissions. Moreover, it advances these goals without placing an unreasonable burden on any region of the country and assists Canadian industry to make the successful transition to a less carbon-intensive global economy.

Canadian companies are internationally recognized for their innovative processes. We are well-positioned to play a leadership role and benefit from the global shift to new technologies and new industries.

This Plan proposes both short-term action and a longer-term perspective. Some things can be done now, such as providing Canadians and Canadian businesses with the tools and incentives to make more energy efficient decisions; others will be done over a number of years, such as investing in more energy-efficient technologies and production methods and switching to less carbon-intensive forms of energy.

Still other initiatives, including investments in research and development in areas such as carbon management, bio-technologies, fuel cells and the hydrogen economy, will require longer periods for both implementation and results.

While we must be clear with respect to our climate change objectives, the Plan itself – by necessity – will remain a work in progress. It will evolve over time as we learn from our efforts and adapt to new possibilities and new technologies.

The Plan provides a framework and proposes a further range of initiatives for reducing greenhouse gas emissions. It will continue to evolve as Canadians and their governments work together to create the healthy environment and dynamic economy we want for ourselves and for future generations of Canadians.

With commitment and resolve, we will build that future together.

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Executive Summary

Introduction

Addressing climate change presents Canada with both an important challenge and an exciting opportunity. Meeting this challenge and seizing this opportunity will require nothing less than a national effort – one that engages every Canadian and includes every region.

That process is well begun. From Iqaluit to St. John's to Tofino, Canadian households are already involved in protecting the environment: recycling, reducing and reusing. We now need to take the next step by improving the energy efficiency of our homes and making more informed choices when deciding what products and vehicles to buy.

Canadian companies are also at the forefront, developing new fuels and new technologies and cutting their greenhouse gas emissions while improving their bottom lines.

Provincial and territorial governments are moving to develop comprehensive strategies to help address climate change. They are implementing a range of measures to promote energy efficiency while investing in sources of renewable energy. Canada's cities are encouraging alternative forms of transportation, using renewable energy and retrofitting buildings.

This Plan builds on those efforts and sets out ways that will stimulate further action. In doing so, it charts a way to meet our international obligations, enhance our competitiveness and improve the quality of life for all Canadians.

The Science

The international scientific community has concluded that there is compelling evidence that human activity, particularly activities associated with energy use and deforestation, is accelerating the concentration of greenhouse gases in our atmosphere. There is general agreement that the global community faces the likelihood of increases in the earth's average surface temperature ranging from 1.4 to 5.8°C by 2100, with serious implications for global food and freshwater supplies, as well as many other implications.

In Canada we are already feeling the effects of climate change, in the form of:

- increasing number and intensity of heat waves and related health problems;
- declining water levels in the Great Lakes;
- changes in fish migration and melting of the polar ice cap;
- insect infestations in British Columbia's forests;
- hotter summers and higher levels of smog in major urban centres; and
- more extreme weather events such as droughts on the Prairies, ice storms in eastern Canada, flooding in Manitoba and Quebec.

As climate change-related events such as these become more frequent, they will have an increasingly profound effect on our economy, our health and our quality of life.

Our Canadian Approach

The overall approach outlined in the Plan reflects the principles suggested by provincial and territorial governments in their October 28, 2002 statement on climate change policy.

For example, the Plan is consistent with principles articulated in that statement such as the sharing of benefits and burdens across the country, the importance of a made-in-Canada approach, the need to continue to pursue recognition for Canada's exports of cleaner energy and the necessity of recognizing early action by industry. Specifically, the Plan recognizes the importance of:

- a made-in-Canada approach based on collaboration, partnerships and respect for jurisdiction;

- no region bearing an unreasonable burden;
- taking a step-by-step approach that is transparent and evergreen;
- minimizing mitigation costs while maximizing benefits;
- promoting innovation; and
- limiting uncertainties and risks.

Proceeding on this basis will enable Canada to make a smooth transition to a more energy-efficient and less emissions-intensive society. This is a challenge that every country in the world will have to face in the coming decades. By acting now, Canadian companies and individuals can get ahead of the curve and create a sustainable competitive advantage. The development of new products and services, in turn, will stimulate economic growth, expand exports and create jobs for Canadians.

The Plan sets out a three-step approach for achieving Canada's climate change objective of reducing annual greenhouse gas (GHG) emissions by 240 megatonnes (MT). First, there are the investments to date that will address one third of the total reduction (80 MT). Second, it articulates a strategy for a further 100 MT reduction. And finally, it outlines a number of current and potential actions that should enable Canada to address the remaining 60 MT reduction.

By necessity, the Plan will need to evolve over time. As new ideas emerge, new technologies are developed and better approaches suggested, we must be flexible enough to shift our resources from less effective actions to those with more potential to deliver emissions reductions.

Moving Ahead

The Plan proposes a national goal – for Canadians to become the most sophisticated and efficient consumers and producers of energy in the world and leaders in the development of new, cleaner technologies. To achieve our goal, the Plan proposes five key instruments:

- **Emissions reductions targets for large industrial emitters established through covenants with a regulatory or financial backstop** that would create an incentive for shifting to lower-emissions technologies and energy sources, while providing flexibility for these **emitters through emissions trading and access to domestic offsets and international permits**;
- **A Partnership Fund** that will cost-share emissions reductions in collaboration with provincial and territorial governments, as well as municipalities, Aboriginal communities, non-governmental organizations and the private sector to increase energy efficiency and reduce emissions in the most effective way;
- **Strategic infrastructure investments** in innovative climate change proposals such as urban transit projects, intermodal transportation facilities and a CO_2 pipeline;
- **A coordinated Innovation Strategy** that allows Canada to benefit fully from the innovation possibilities of our climate change agenda and builds on programs such as Technology Partnerships Canada, the Industrial Research Assistance Program (IRAP), Sustainable Development Technology Canada and the Technology Early Action Measures (TEAM); and
- **Targeted measures** including **information, incentives, regulations and tax measures** that will help achieve our climate change objectives in specific sectors and program areas.

Key Areas for Action in the Plan

Using these tools, the Plan identifies action in seven broad areas: transportation, housing and commercial/institutional buildings, large industrial emitters, renewable energy and cleaner fossil fuel, small and medium-sized enterprises and fugitive emissions, agriculture, forestry and landfills, and the international market.

Transportation

The Plan takes investments already in place and sets out further measures to improve fuel efficiency, expand the use of ethanol and other low-carbon fuels and promote more energy-efficient urban and freight transportation. In particular, the Plan:

- renews our commitment to working with automotive manufacturers to **improve new vehicle fuel efficiency by 25 percent by 2010** and proposes

additional steps to encourage consumer demand for more efficient vehicles;
- commits to new investments to **increase the use of public transit** and **manage growth in vehicle use**;
- sets the goal of increasing the amount of gasoline containing **10 percent ethanol blend to 35 percent of the market**, in collaboration with the provinces and territories, and the amount of **biodiesel production to 500 million litres**; and
- proposes improved **performance targets and best practices for all freight transport, and enhanced intermodal infrastructure**.

Housing and Commercial/ Institutional Buildings

Canadians have a tremendous opportunity to become more energy efficient and lower their home energy costs by taking a number of basic steps around their homes. The Plan will create the conditions for more informed choices and actions by:

- expanding cost-shared **home energy audits for homeowners**; and
- **providing information** to encourage consumers to purchase **energy-efficient appliances and equipment**.

The Plan also proposes that governments work towards the following goals:

- energy-efficient retrofits of **20 percent of the housing stock** and **20 percent of the commercial/institutional building stock** by 2010; and
- building all new homes to **R2000** or equivalent standard by 2010 and all new commercial/ institutional buildings to a minimum of **25 percent above the Model National Energy Code** by 2010.

Large Industrial Emitters

This Plan proposes a comprehensive approach to the large industrial emitters sectors. The three-pronged strategy, which is being developed in consultation with the provinces, territories and industry, involves:

- **emissions targets established through covenants with a regulatory or financial backstop in consultation with industry, provinces and territories**;
- **domestic emissions trading,** with access to **offsets and international permits**; and
- **cost-shared strategic investments** in a number of areas such as:
  - renewable energy;
  - clean coal demonstration projects; and
  - a CO_2 pipeline.

Renewable Energy and Cleaner Fossil Fuel

Increased use of renewable energy and demonstration of innovative new technologies for cleaner fossil fuels can contribute both to meeting Canada's Kyoto target and to getting Canada's industrial sector on a longer-term lower emissions intensity path. The Government will:

- set a target of **10 percent of new electricity generating capacity from emerging renewable resources**;
- work with provinces to identify and develop options to address impediments to new regional hydroelectricity transmission and generating capacity;
- consider participation in **suitable clean coal technology demonstration project(s), whether a retrofit and/or a new plant**; and
- work with provinces and private sector to **explore the establishment of a CO_2 capture and storage pipeline**.

Small and Medium-Sized Enterprises (SMEs) and Fugitive Emissions

Small and medium-sized enterprises and other low-emissions businesses can play an important role in achieving our climate change objectives through voluntary energy efficiency improvements. The Plan will:

- expand the Canadian Industry Program for Energy Conservation (CIPEC) to include SMEs;
- cost-share energy efficiency audits;
- continue to provide information and assistance, through the Industrial Research Assistance Program, on the best energy efficiency technology available to small manufacturers; and

- promote practices to reduce flaring and venting of waste gases.

Agriculture, Forestry and Landfills

Agriculture, forestry and landfills are all areas where new activities to reduce emissions and increase sinks represent potential offset credits in a domestic emissions trading system. To achieve this, the Government will:

- establish a framework to enable new **agriculture and forestry sinks** (beyond the 30 MT in sinks from existing practices) to be sold as offsets in an emissions trading system; and
- consult on whether to regulate emissions reductions from new capture and flaring of landfill gas to allow them to be sold as offsets.

International Emissions Reductions

The Plan builds on the efforts of Canadian businesses that are already active in the international emissions permit trading market. This will help developing countries chart a lower emissions path while creating profitable business opportunities for Canadian companies. To achieve this, the Government will:

- work with the private sector to establish a mechanism for efficient engagement in projects in developing countries; and
- consider the purchase of a minimum of 10 MT of international permits.

Canadians, Communities and Governments

Seizing the opportunity to reduce emissions will require the collective effort of all Canadians. The Plan:

- proposes a personal goal for each Canadian to reduce emissions by **an average of one tonne per year by 2008-2012**, supported by incentives, improved information and product availability;
- emphasizes **partnership with provinces, territories, communities, the private sector and non-governmental organizations** to further reduce emissions through a variety of means including waste diversion and land-use planning;
- commits to ongoing **collaboration with Aboriginal and northern communities** to build capacity to address their particular priorities; and
- invites governments at all levels to **lead by example**.

Cost Estimates

Economic modelling suggests that these actions should not increase fuel prices significantly and many of the actions could result in lower energy bills – for both business and consumers – through greater energy efficiency.

Overall, the economic modelling suggests that the impact of taking action on climate change is manageable. In the most likely scenario, Gross Domestic Product (GDP) is reduced by only 0.4 percent in 2010. In other words, rather than growing by 18 percent between 2002 and 2010, the economy would grow by around 17.6 percent. Employment would increase by 1.26 million jobs instead of 1.32 million. Personal disposable income would not be affected.

Meeting Canada's climate change goals calls for new directions to be set and new strengths to be developed. It requires the best of our citizens and scientists, our innovators and entrepreneurs. It is an opportunity to enhance both the competitiveness of our economy and the quality of our lives: a national project worthy of a great country.

I. Climate Change and the United Nations Kyoto Protocol

A. The Science

There is a strong consensus among scientists that climate change is already occurring and that human activity is contributing to it.

The Earth's temperature is determined in part by a naturally occurring process known as the "greenhouse effect". While certain greenhouse gases occur naturally, human activities are releasing additional greenhouse gases into the atmosphere.

Data collected from polar ice cores show that concentrations of CO_2, which had been stable at about 280 parts per million by volume for the 10,000 years between the last ice age and the start of the 19th century, have today increased by about 30 percent. If current trends in greenhouse gas emissions continue, by the end of this century their concentration in our atmosphere could be double what they had been prior to the industrial revolution.

While uncertainties exist about the timing and rate of future changes in this concentration, the UN Intergovernmental Panel on Climate Change (IPCC) – an international body made up of 2,000 of the world's top climate scientists – estimates that the average global surface temperature is likely to increase by between 1.4 and 5.8°C by 2100. While these changes may seem modest, even small changes in global average temperatures can have a dramatic impact on our climate. The last time the earth's average temperature was 5°C colder, for example, Canada was covered with three kilometres of ice.

Scientists have also concluded that changes consistent with global warming are already occurring in different parts of the world. Mountain glaciers are retreating, the global sea level is rising and climate zones are shifting. The 20th century was the warmest century of the last millennium; the 1990s were the warmest decade of the last century and the years 1999 and 2001 were the warmest years yet. This is well beyond the range of natural climate variability.

Because scientists expect that northern nations will be more affected by climate change than those closer to the equator, Canada is particularly vulnerable. We are already feeling the effects: increasing heat waves and related health problems, declining water levels in the Great Lakes, changes in fish migration and melting polar ice caps, as well as insect infestations in British Columbia's forests.

What are greenhouse gases?

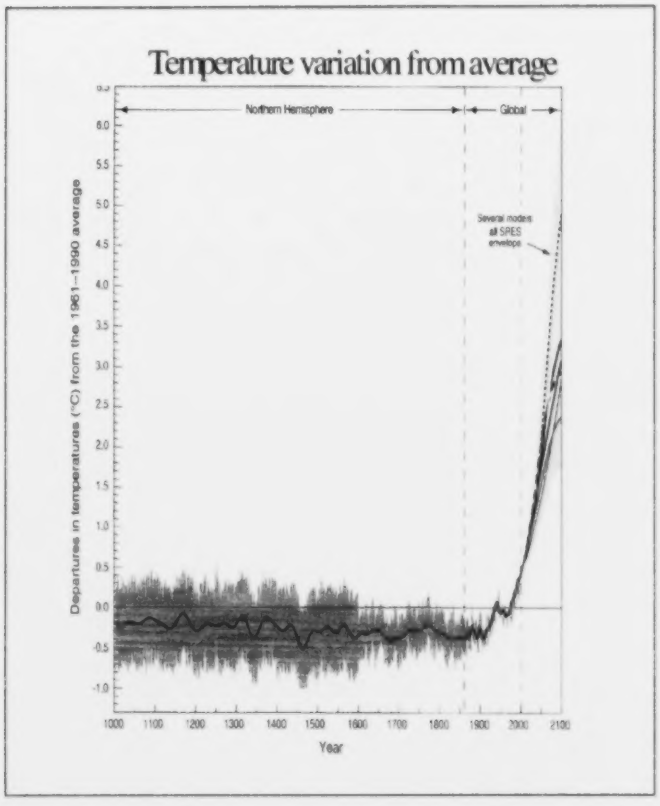
Naturally occurring greenhouse gases include water vapour, carbon dioxide, methane, nitrous oxide and ozone. Certain human activities produce more of these gases and other activities can create greenhouse gases that do not naturally occur.

Carbon dioxide (CO_2): An increasing amount of carbon dioxide is being released by the burning of fossil fuels (coal, oil, natural gas) for industrial purposes, transportation and the heating/cooling of buildings, as well as by deforestation.

Methane (CH_4): An increasing amount of methane is being released from landfills, wastewater treatment, certain agricultural practices, as well as from grazing livestock.

Nitrous oxide (N_2O): An increasing amount of nitrous oxide is being emitted into the atmosphere through the use of chemical fertilizers and the burning of fossil fuels.

The three greenhouse gases that are not naturally occurring, but which are included in the Kyoto Protocol, are: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6). These gases are generated in a variety of industrial processes.



What is more, we are only beginning to get a sense of the costs related to climate change, such as hotter summers, higher levels of smog in major urban centres and more extreme weather events such as droughts on the Prairies, ice storms in eastern Canada or flooding in Manitoba and Quebec. There are also the costs associated with disturbing ecosystems, from fish stocks to forestry.

All of these will have a profound effect on our economy, our health and our quality of life.

B. Why the UN Framework Convention on Climate Change?

There is strong agreement among Canadians on the need to address climate change. There has been discussion, however, of how best to achieve our climate change objectives and whether we should address the challenge of climate change independently or within an international framework.

Greenhouse gases have the same impact on the atmosphere regardless of where they are emitted. That is why a global approach is required to effectively address the climate change challenge.

In 1992, that approach was launched with more than 155 countries, including Canada, signing the United Nations Framework Convention on Climate Change (UNFCCC).

Since then, a number of United Nations conferences have been held, including one in Kyoto, Japan in 1997. The outcome of that conference was a Protocol to the UNFCCC. The Kyoto Protocol established legally binding targets for those industrialized countries that ratify the agreement and the timeframes within which those targets are to be met. Additional operational details were agreed to at subsequent meetings in Bonn, Germany and Marrakech, Morocco.

Canada has supported this United Nations process as the most effective means of ensuring global action.

The Protocol is important both for the direction it sets and the international agreement it represents. It remains the only available instrument for providing a global response and, should it fail, it would take years to negotiate a new agreement, delaying action and prolonging uncertainty.

The Protocol points us toward a future of lower greenhouse gas emissions, greater energy efficiency, sustainable growth, innovative technologies and cleaner air. At the same time, the Protocol represents only a first step – not the last word – on climate change. It will continue to evolve and, as it does so, we will take every opportunity to ensure that it is improved and strengthened.

In particular, we agree with the principle identified by the provinces and territories in the October 28, 2002 statement on climate change policy with respect to recognition for cleaner energy exports. We will continue to pursue recognition for our cleaner energy exports.

Similarly, as we move forward we will work to extend the responsibilities under the Kyoto Protocol to an increasing number of countries. As a first step, however, the industrialized countries have the resources to play a leadership role in tackling this global challenge. Just as they have led on issues such as international agreements on trade, industrialized nations must also set the pace on environmental issues.

It is anticipated that in future rounds, major developing countries will assume emissions targets, moving us closer to a truly global response.

Canada was a key supporter of, and contributor to, the Kyoto Protocol. Some of the international mechanisms and the provisions on "sinks", for example, were to a significant degree "made by Canada". If used effectively, they provide us with additional flexibility to meet our goals.

Under the Protocol, Canada has agreed to lower its greenhouse gas emissions to 6 percent below 1990 levels during the first commitment period (2008 - 2012). The Kyoto Protocol does not tell us how to meet this target: that is entirely up to Canadians.

This is an ambitious target that offers significant opportunities. The transition to an economy based on lower-emissions energy is the way of the future and Canada has the opportunity to set the pace and lead the way.

Canadians will benefit not only from new jobs and innovation, but also through the impact on their daily lives – they will be able to enjoy a healthier environment, cleaner air and lower energy costs.

We will work to meet our international commitments in a way that is most beneficial to Canadian interests. The extensive consultations we have had with provincial and territorial governments, industry, non-governmental organizations, as well as individual Canadians, provide a strong basis for the framework that is put forward in the following pages. The Plan will continue to evolve as new ideas and new approaches emerge.

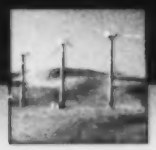
C. Competitiveness Considerations

The decision by the Bush administration not to ratify the Kyoto Protocol poses an important challenge from both a climate change and competitiveness perspective. The United States is the largest total emitter of greenhouse gases and the largest emitter per capita among industrialized countries.

We should recognize, however, that the United States government is making large investments to spur innovation and encourage wider use of cleaner energy. Canada will continue to work with the United States on a range of climate change-related areas where collaboration can be of mutual benefit.

In addition, many individual states are already taking important steps to reduce greenhouse gas emissions. Oregon, Massachusetts and New Hampshire, for example, are regulating CO_2 emissions from power plants, including the use of offsets. The New England Governors, in conjunction with the Eastern Canadian Premiers, have committed to stabilizing greenhouse gases at 1990 levels by 2010 and to a 10 percent reduction by 2020. California recently passed legislation that allows the state to regulate the amount of greenhouse gases that are emitted by new automobiles and light trucks, beginning with the 2009 model year.

For Canada, the US position presents unique challenges given our close economic relationship. This Plan takes account of that relationship and of the competitiveness concerns raised by Canadian industry. We need not – and we will not – export Canadian jobs in order to meet our climate change goals.



II. Canada's Approach to Climate Change

If addressing climate change is to become a national project, it must reflect both the values and diversity of our country. While pointing us to the economic opportunities of the future, it must also address the economic realities of today. What is required is a principles-based approach that recognizes our unique circumstances and promotes our collective interests.

This approach is consistent with that put forward by the provincial and territorial governments in their statement on climate change policy issued on October 28, 2002. Those principles, including having a made-in-Canada plan focused on innovation and competitiveness, no unreasonable burden on any region of the country and recognition for early action, are reflected in the following pages and throughout the Plan.

A. Key Principles

The following key principles guide the Plan:

It must be a made-in-Canada approach that is based on collaboration, partnerships and respect for jurisdiction.

Working within an international framework, our approach addresses Canadian circumstances and takes advantage of our unique opportunities.

The Government of Canada agrees with the principle identified in the provincial and territorial statement on climate change policy that calls for Canadians to have the opportunity to provide input into the development of the Plan. That is why, following the release of the May 2002 *Discussion Paper on Canada's Contribution to Addressing Climate Change*, a series of workshops were held in each of the 14 major cities across the country in June 2002. More recently, hundreds of Canadians have taken the opportunity to provide comments and submissions on the Overview of the Draft Plan that was released in October of this year.

The options that were presented in the Discussion Paper itself, as well as the initiatives in the Plan, have been developed after extensive consultations with provincial and territorial governments, industry, non-governmental organizations, community leaders and individual Canadians over several years. The Plan also provides for and bu lds on the priorities identified by those provincial and territorial governments that have developed their own climate change plans.

Greater use of renewable energy sources, improving the energy efficiency of buildings, equipment and appliances, making better use of sinks or promoting public participation through education and outreach, are areas identified by provinces and territories and that are reflected in the Plan. Some provincial plans also include proposals with respect to increasing the use of ethanol, developing CO_2 capture and storage infrastructure, proceeding with clean coal demonstration projects and enhancing public transit systems.

All of these areas are addressed by the Plan and provide a substantial foundation on which to build a concerted national effort. In determining how best to achieve our goals, we must continue this collaborative approach ensuring that provincial and territorial jurisdiction is respected in the process.

There must be a reasonable sharing of benefits and burdens requiring responsible investment by all.

The Plan reflects the commitment made by First Ministers in 1997 and the principle reiterated by the provincial and territorial statement on climate change policy issued in Halifax on October 28, 2002, that no region or jurisdiction of the country should be asked to bear an unreasonable burden in the realization of our climate change goals. The Plan draws on the lessons learned from the analysis and modelling studies (see Annex) and develops an approach that is fair and equitable while at the same time calling on every government, every region, every sector, indeed every Canadian to do their share.

All governments will need to contribute to the success of a national plan. For its part, the Government of Canada will provide additional resources for federally led initiatives and co-invest in partnership arrangements, with provinces and territories and the private sector, that help meet Canada's emissions reduction target. The Government will ensure that resources are adequate to achieve our goal and will do so in a fiscally prudent manner, aligning existing programs in support of climate change objectives and phasing in new spending over several budgets.

Our approach must be transparent and proceed step by step, keeping our Plan evergreen.

It is essential that what is being asked of Canadians be clear, consistent, reasonable and achievable. The Plan reflects a commitment to transparency, where the process is open, the timelines certain and the expectations clear. Industry must be able to plan and operate with an acceptable degree of uncertainty and risk. And Canadians should know what is expected of them – there should be no surprises.

Our approach must also be both prudent and responsible in taking the actions that are needed. That is why the Plan proposes that we proceed step by step, continuously monitoring and measuring the effectiveness of new actions against the success of those underway. This will allow us to learn as we go and adjust to changing circumstances. As we pursue our objectives for a more innovative and dynamic economy, new technologies and opportunities will emerge and additional approaches will be suggested. We must retain the flexibility required to reflect these new realities and put them to work for Canadians.

Minimize mitigation costs and maximize benefits.

The Government of Canada shares the view of the provinces and territories that we must maintain the economic competitiveness of Canadian business and industry. Our aim should always be to reduce greenhouse gas emissions in the most cost-effective way possible. Specific approaches for doing so, such as market-based instruments, are discussed in the following sections. One of the key ways of applying this principle, however, is by ensuring that all orders of government work together, combining the opportunities available to governments within their respective jurisdictions.

Canada will continue to enjoy strong economic and employment growth across all sectors of the economy, though there may be shifts in employment among firms as normally occurs as the economy adjusts to changing circumstances and influences. New job opportunities will appear as the markets for emerging technologies mature and as initiatives to reduce emissions are implemented (e.g., in the area of home retrofits or construction of a CO_2 pipeline). Other areas may see an evolution in the nature of the knowledge and skills required of the work force. The Government of Canada will work through a joint government-labour committee to monitor any such changes. Particular attention will be focused on labour mobility issues, particularly in rural Canada, and on skills training issues as workers move into new technology areas. The full range of worker adjustment and skills training programs would apply.

Costs can also be reduced by recognizing that our climate change goals are complementary to other key objectives that are also being pursued, such as the clean air agenda, renewing our national infrastructure and fostering a more innovative economy.

Promote innovation.

We agree with the principle identified by the provinces and territories in their climate change statement of October 28, 2002 that the Plan must support innovation and new technology. Through innovation we will be able to maintain our strong economic growth, create additional export opportunities and reduce greenhouse gas emissions. Significant progress can be made by using the best of today's technology throughout Canada, a step which would also lower the cost of those technologies through economies of scale.

We must accelerate the development and adoption of new low-emissions technologies. Many climate-friendly technologies are within reach for the first commitment period of the Kyoto Protocol. At the same time, we know that larger emissions reductions will be required over the longer term, and that this will require more than efficiency in our use of fossil fuels. It will also require improved reliance on cleaner energy.

Doing so will enable Canada to get ahead of the curve and stake out a leadership position in the emerging technologies that will transform the economies of tomorrow.

To promote innovation, we will create incentives for developing and applying new technologies, ensure a fair and competitive tax system, and foster research and development that will provide long-term solutions.

Limit uncertainties and risks.

Like the provinces and territories, the Government of Canada is committed to responsibly managing the risks related to meeting our climate change objectives. Applying this principle means governments working with industry to limit uncertainties and address concerns about competitiveness. It means building in contingencies, assessing our progress and adjusting our approach and level of investment. It means remaining engaged in joint efforts with the United States to ensure that Canada remains competitive and takes advantage of future technological opportunities.

As we move forward, our progress should be assessed against these key principles. They reflect the values we hold and they must guide the policies we pursue. Doing so will enable Canadians to make their own decisions on how best to achieve our climate change objectives.

B. Three Steps to Achieving our Target

As noted in the previous section, under the Kyoto Protocol, Canada committed to reducing its greenhouse gas emissions to 6 percent below 1990 levels on average through the first commitment period (2008 - 2012) - a reduction of 240 MT from our projected "business-as-usual" emissions level in 2010.

As outlined in Table 1 below, the Plan is a three-step approach to meeting Canada's target. Step I includes actions already underway, which are expected to reduce emissions by 80 MT. Step II involves further measures outlined in this document, which are expected to reduce emissions by a further 100 MT. Step III will address the remaining 60 MT.

Table 1: Overview of the Three Steps

	Step I: Actions Underway	**Step II: New Actions**	**Step III: The Remainder**
Actions by Canadians and Governments: Transportation and Buildings	13 MT	15-20 MT	Current and potential actions that could achieve approximately 60 MT are outlined on page 14
Large Industrial Emitters	25 MT	55 MT	
Other Industrial Emissions: Technology, Infrastructure and Efficiency Gains		16 MT	
Agriculture, Forestry and Landfills; Sinks and Offsets	38 MT	*	
International Market	2 MT	Minimum 10 MT	
Total	Approximately 80 MT	Approximately 100 MT	

** Offsets are estimated at 20 to 28 MT; because they may be sold to industry through domestic emissions trading, they are not added to the total.*

Step I: Actions Underway (80 MT)

Since 1998, the Government of Canada has committed $1.6 billion in climate change initiatives, across all sectors and involving every region. Measures announced in Action Plan 2000 and Budget 2001 are expected to reduce emissions by 50 MT annually over the next five to ten years.

Many of these initiatives are being carried out in partnership with the provinces, territories and private sector and have been in operation for less than a year. An assessment of their effectiveness will be initiated in the coming months and, if required, resources will be shifted away from initiatives that are not meeting expectations into areas that have the potential to be more effective.

Canadian experts estimate that Canada's agricultural soils and forests will also absorb additional greenhouse gases from the atmosphere due to sound management practices. These ongoing actions are expected to bring credits of 30 MT annually to Canada. Under the Protocol, there is room to increase our sinks credits further through broader actions and investments.

What is a carbon sink?

A "sink" is any process that removes CO_2 from the atmosphere and stores it. Forests and agricultural soils can act as carbon sinks. Plants absorb CO_2 from the atmosphere through the process of photosynthesis. The CO_2 is stored in the plant tissue. Agricultural soils can act as a sink when CO_2 removed from the atmosphere by crops is stored in the roots. When the plant dies, some proportion of the plant tissue remains in the soil and is transformed into soil organic matter.

When combined with the annual 50 MT already noted, this brings the total emissions reduction through current actions to 80 MT – one third of the way to our 240 MT target.

What is a megatonne?

This document frequently uses the megatonne (MT) as a unit of measure for greenhouse gas emissions. A megatonne is shorthand for one million tonnes. Each tonne equals one thousand kilograms. What does this mean in everyday terms? The average Canadian is responsible for about 5.4 tonnes of greenhouse gas emissions every year. All references in this document are to annual emissions of greenhouse gases.

1 megatonne = 1,000,000 tonnes

1 tonne = 1,000 kilograms

Step II: New Actions (100 MT)

As shown in Table 2 on the following page, the Plan proposes three priority areas for new action, details of which are provided in subsequent sections:

- Actions by Canadians and governments in the transportation and building sectors;
- Reductions of emissions by industry through a comprehensive approach including targets established under covenants with a regulatory or financial backstop, domestic emissions trading with access to domestic offsets, the international carbon market, as well as strategic investments in renewable energy, technology and infrastructure; and
- Government purchases of permits in the international market.

Together, the actions already underway and those proposed in this step of the Plan are expected to address 180 MT of our 240 MT target, leaving 60 MT for the next phase.

Table 2: Emissions Reductions from Step I and Step II

	Canadians and Governments		Industrial Emitters			Land cover and use	Internation-al market	Totals
	Trans-portation	Housing and Buildings	Emissions Trading	Renewable Energy and Innovative Projects	Small and Medium-Sized Enterprises (SMEs) and Fugitive Emmissions	Agriculture, Forestry and Landfill Gas		
Business-as-usual (BAU) emissions 2010	206	84	<— 425 —>			94	NA	809
Step I Actions Underway: Action Plan 2000 Budget 2001	9	4	<— 25 —>			8	2	Approx. 80
BAU Sinks						30		
Step II New Actions	12	4	55	11	5	Potential Offsets*	10 Minimum	Approx. 100
Total Emissions Reduction Targets for Steps I and II	21	8	96			38	12 Minimum	Approx. 180

** Estimated at 20 to 28 MT; because they may be sold to industry through domestic emissions trading, they are not added to the total.*

Step III: The Remainder (60MT)

A number of current or potential reductions could help to meet the remaining 60 MT gap.

To support local priorities and promote energy efficient innovation in all sectors, the Government of Canada will establish a Partnership Fund with the provinces, territories, municipalities, Aboriginal communities, non-governmental organizations and the private sector. This Fund is described in greater detail later in this section. The emissions reductions produced by the Fund will depend on the level of investment by all partners and the cost-effectiveness of the initiatives. It is assumed here that the Fund could result in additional reductions of between 20 and 30 MT.

In addition, there are a number of existing technological research and development (R&D) investments directed at climate change issues that are just getting underway, such as Technology Partnerships Canada, Sustainable Development Technology Canada and the Technology Early Action Measures (TEAM) program. None of the emissions reductions that may result from these existing and future technology investments have been counted in the 180 MT reduction contemplated in Steps I and II of the Plan.

Technology initiatives and R&D investments could reduce emissions by an additional 10 MT or more in the first commitment period. Successful commercialization will be critical and rely upon success in pre-commercial pilots as well as in the marketplace itself.

Similarly, provincial and territorial initiatives to date have not been quantified for the purposes of this Plan. These efforts could reduce emissions by a further 10-20 MT. In addition, 100 municipalities across Canada are designing community-wide emissions reduction plans that could eliminate a further 10 MT of emissions.

The Plan estimated 24 MT in reductions through actions by individual Canadians. There are 31 million Canadians, and if each Canadian meets the goal of reducing emissions by one tonne, there would be an additional 7 MT of reductions.

Finally, the Government of Canada is in agreement with the principle put forward by the provincial and territorial governments in their October 28, 2002 statement on climate change policy that we will continue to pursue recognition for our cleaner energy exports. Such recognition could result in credits of up to 70 MT.

Table 3: Examples of Current or Potential Reductions that Could Meet the Remaining 60 MT Gap

• Partnership Fund for working with provinces, territories, municipalities, Aboriginal communities, private sector and non-governmental organizations as well as infrastructure funding	• 20-30 MT
• Existing and future technology R&D investments that produce emissions reductions	• 10 MT
• Provincial and territorial actions underway not involving federal partnerships	• 10-20 MT
• Community-wide emissions reduction plans by 100 municipalities	• 10 MT
• A challenge to Canadians to reduce emissions by 1 tonne each (31 million Canadians; only 24 MT included in Step 2 of the Plan)	• 7 MT
• Credits for cleaner energy exports	• Up to 70 MT

As can be seen from the preceeding tables, the goal of reducing emissions by 240 MT is within our reach. Canada is positioned to meet its climate change target and, as we gain experience and progress is made, new opportunities for emissions reductions will become available.

C. Instruments

Based on extensive consultations on the Discussion Paper released in May 2002, the Plan sets out a mixed approach involving five specific instruments:

- Innovation and Technology Investments
- Infrastructure Investments
- A Partnership Fund
- Covenants and Emissions Trading by Industry
- Targeted Measures

Consistent with the principle identified by the provincial and territorial governments in their statement on climate change policy, most of these instruments, including innovation, infrastructure, the Partnership Fund and targeted measures, will allow for both bilateral and multilateral approaches to our climate change priorities. The specific approach taken on different issues will be developed through discussions with provincial and territorial governments. On some issues, governments will take action independently within their own jurisdiction. On many issues, a bilateral approach may be preferred, while on other issues a multilateral approach may be the most effective way forward.

Innovation and Technology Investments

Innovation and technology will be key to the long-term solutions to climate change. Policies to address climate change, both in Canada and internationally, will spur innovation and – in the process – create new economic opportunities for first movers. We must ensure that Canadians can take full advantage of these opportunities.

The Government of Canada will increase investments in innovation and technology related to climate change, as well as reallocate funds from existing programs to climate change initiatives where appropriate.

Over the longer term, addressing climate change will transform the energy economy. To achieve our objectives, however, we will need to consider how that transition can be managed effectively.

Many of the most cost-effective investments that are currently available for reducing greenhouse gases are based on increasing energy efficiency. Further investments in technological solutions to enhance energy efficiency will yield climate change benefits and can also provide advantages to consumers and industry by lowering costs. Examples include integrated energy management systems for buildings, lightweight materials for vehicles and eco-efficient industrial processes.

In terms of energy supply, change will initially be centred on cleaner fossil fuels and the continued development and penetration of alternative non-fossil transportation fuels and emerging renewable energies. For fossil fuels, shorter-term technological advances will involve technologies such as more efficient oil and gas production and distribution. These advances will be complemented by an increase in community-based distributed power systems, as well as the increased use of co-generation and waste heat recovery.

In the medium term, the transformation will involve the development and deployment of integrated carbon management systems (often known as CO_2 capture and storage) and clean coal power production. Continued technological advances will lower costs, encourage greater uptake of wind and photovoltaic power, and enable industrial processes that are less emissions-intensive.

In the longer term, many of the challenges will be around next generation energy systems and infrastructure related to power distribution. Among these emerging technologies are intelligent emissions control systems and direct solar steam generation.

Next generation energy systems include fuel cells and the "hydrogen economy". Fuel cells powered by hydrogen could replace the internal combustion engine and provide power sources for buildings. Canadian companies are already world leaders in fuel cell and hydrogen technologies.

Under Action Plan 2000, the Government of Canada is working with industry to resolve the challenge of re-fuelling infrastructure for fuel cells. The Government is also prepared to explore further means by which Canada's leadership in this area can be supported, including demonstration of fuel cells in federal buildings. Key to the hydrogen economy will be the development of clean, efficient energy sources to produce hydrogen.

Biotechnology offers another area of opportunity for climate- and environmentally friendly innovation. Bioproducts, for example, use plants to produce fuels such as ethanol that can be blended into gasoline and a wide range of products, including plastics, textiles, paints, lubricants, solvents, adhesives and even cosmetics. Enzymes and biocatalysts are also used in industrial processes to supplement or replace more energy intensive processes. Bioproducts provide alternatives to products derived from fossil fuels (e.g., gasoline and petrochemicals) and can help avoid substantial greenhouse gas and other emissions. Growth in bio-based products will also stimulate rural economic development by creating new markets for what are now waste materials. The Government of Canada is joining with provincial governments, industry and academia to develop a technology roadmap for further advancing bioproducts in Canada.

Infrastructure

Modern infrastructure is a vital part of creating and maintaining prosperity in Canada. It is also a key part of positioning Canada to take advantage of opportunities in the greener economy of tomorrow.

As announced in the recent Speech from the Throne, the Government of Canada will work with provinces and municipalities to establish a ten-year infrastructure program that will accommodate long-term strategic initiatives essential to competitiveness and sustainable growth. This will be key to the quality of life in both urban and rural areas.

Within this framework, a new strategy for a safe, efficient and environmentally responsible transportation system will be introduced. Such an initiative could help reduce congestion in cities and bottlenecks in trade corridors, while improving air quality.

New urban transit infrastructure in some of Canada's largest cities can contribute to more efficient movement of goods and people, while reducing greenhouse gas emissions.

Similarly, intermodal freight technologies – integrating rail, water and road – could significantly reduce traffic congestion while providing co-benefits such as reducing air pollution and greenhouse gas emissions.

The Government of Canada will explore investments in projects such as a pipeline to move CO_2 from emissions sites to locations where it can be utilized or stored, in order to help achieve our climate change objectives, while at the same time encouraging greater energy production productivity and innovation.

Partnership Fund

As with any national project, the heart of the Plan is partnerships. Innovation and infrastructure are two areas where the Plan will build on the Government of Canada's long and successful track record of working closely and collaboratively with provinces, territories, municipalities and communities, Aboriginal peoples, the private sector and non-governmental organizations. The Government of Canada will also create a new mechanism, a Partnership Fund, through which it will co-invest and collaborate on emissions reduction projects.

Governments and stakeholders across Canada face different opportunities, challenges and priorities for action on climate change. In addition, many are engaged in ongoing processes of developing their own strategies and plans. The Partnership Fund will enable the Government of Canada to be responsive to this diversity of interests and evolution of ideas.

The overall approach is to establish a fund through which the Government will cost-share the best emissions reduction proposals as they emerge over time. The Fund will be results-oriented, selecting the most cost-effective projects while also taking into

careful consideration other criteria such as the overall degree of leverage of project funding and environmental and public policy co-benefits.

The Partnership Fund will be an important vehicle by which the Government of Canada will support and collaborate with provincial and territorial governments on the implementation of their plans. It will also complement other partnerships through federally led emissions reduction measures, and new and existing funding on innovation and infrastructure.

The Partnership Fund will ramp up over the next few years. Because its results will depend so much on our partners, we have indicated a range of possible contributions to reducing Canada's greenhouse gas emissions.

Covenants and Emissions Trading

Covenants and domestic emissions trading, as a market-based instrument, holds tremendous potential to minimize the cost of meeting Canada's climate change objectives by exploiting the efficiencies of markets while encouraging innovation and strategic investments.

Companies that emit greenhouse gases would meet their commitments either by reducing their emissions directly or by purchasing domestic offsets or international permits. The requirement for emitters to hold permits for their emissions creates an incentive for the use of lower-emissions technologies and energy sources.

Such an approach is already in use both in Canada and abroad to address a range of environmental issues. Ontario, the United States, the United Kingdom and Denmark, for example, all have some form of trading system for air pollutants or greenhouse gas emissions. And the European Union is planning a union-wide greenhouse gas emissions trading system to be up and running by 2005.

As will be discussed, the Plan outlines options for a domestic emissions trading system, linked to the international carbon market that will be created under the Kyoto Protocol. The Government of Canada will continue to work with industry, provinces, territories and stakeholders to clarify the architecture of a workable, efficient and effective domestic emissions trading system.

Climate Change and Clean Air

Actions to reduce greenhouse gas emissions will also help achieve Canada's clean air goals. This includes reducing emissions of NOx and SO_2 from emitters like thermal electricity plants, refineries and pulp and paper mills, reducing traffic congestion in cities and reducing emissions from homes and buildings. Of the fossil fuels that are burned in Canada, coal has the highest levels of air pollutants and greenhouse gas emissions.

Under the Plan, we will be investing in the commercial-scale demonstration of cutting-edge clean coal technology. This technology will substantially reduce or eliminate greenhouse gas emissions as well as air pollutants such as particulates and mercury. By 2010, new coal-fired power plants should be as clean as natural gas.

In addition, we will be working with provinces and municipalities to increase the use of urban transit, which will decrease traffic congestion in our cities and help improve urban air quality.

These are just two examples of how taking action on climate change will help improve the health of Canadians, reduce the incidence of chronic bronchitis and asthma, and reduce health care costs.

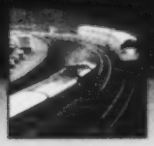
Targeted Measures

Targeted measures can include information (e.g., labelling), incentives (e.g., production subsidies and cost-shared energy efficiency audits), regulations (e.g., energy efficiency standards) and tax measures (e.g., excise tax exemption for ethanol in gasoline).

A number of tax initiatives are already in place to encourage the reduction of greenhouse gas emissions. For example, accelerated depreciation is permitted for certain renewable technologies and the ethanol in gasoline is exempt from the federal excise tax and, in some provinces, from provincial fuel taxes.

The Government of Canada will continue to monitor and consult on climate change-related tax issues with a view to providing a fair, efficient and competitive tax system. In particular, we will assess the tax treatment of permits in a domestic emissions trading system.

In addition, we will consider investments in other specific program initiatives, such as incentives for retrofitting existing homes and expanding the CIPEC program for small and medium-sized enterprises.



III. Meeting our Target and Innovating for the Longer Term

This section outlines proposed next steps in each of the following areas:

A. Transportation
B. Housing and Commercial/Institutional Buildings
C. Large Industrial Emitters
D. Renewable Energy and Cleaner Fossil Fuels
E. Small and Medium-Sized Enterprises and Fugitive Emissions
F. Agriculture, Forestry and Landfills
G. International Emissions Reductions

These next steps can reduce emissions by approximately 100 MT. This is in addition to the actions already underway that are briefly summarized in each section.

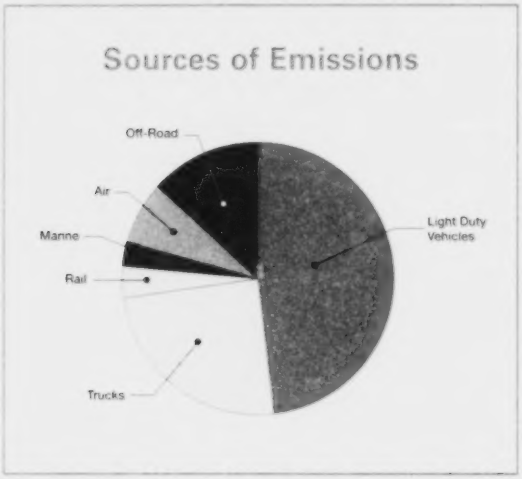
The initiatives include actions that can achieve significant emissions reductions in the shorter term, generally through increased energy efficiency (e.g., building retrofits), and actions that set the stage for innovation and further emissions reductions in the future (e.g., fuel cells and CO_2 capture and storage).

Many of the measures, and the emissions reductions associated with them, have been developed on the basis of the work of the Issue Tables that included business, academic, governmental and non-governmental representatives. The Issue Tables studied opportunities for emissions reductions and reported their conclusions two years ago.

Consistent with the step-by-step approach, additional actions for achieving the remainder of the 240 MT target beyond those discussed in this section would be considered in light of the success of these proposed next steps.

The initiatives represent a framework for action: further consultations with provinces, territories, municipalities, industry, non-governmental organizations and the Canadian public will be necessary on the details of their ongoing implementation.

A. Transportation: Summary



The transportation sector accounts for about one quarter of Canada's greenhouse gas emissions and is a major contributor to smog in our urban areas. Approximately 70 percent of GHG emissions from transportation are a result of people driving cars and goods being moved by truck, and two-thirds of these emissions are generated within urban areas.

The focus for action is on vehicles and fuels that produce fewer emissions, the increased use of alternative modes of transportation for passenger travel and more efficient transport of goods. These actions will also contribute to cleaner air and reduced traffic congestion, making our cities healthier and more sustainable.

Actions Underway (9 MT)

- Negotiations for 25 percent improvement in new vehicle fuel efficiency by 2010 (5.2 MT)
- Increased ethanol production to support introduction of ethanol blending in 25 percent of gasoline supply (0.8 MT)
- Development and demonstration of refuelling technologies and infrastructure for commercialization of fuel cell vehicles (0.1 MT)
- Demonstration of integrated strategies, technologies and planning to reduce urban transportation emissions (0.8 MT)
- Negotiation of voluntary agreements with air, rail, truck and marine sectors to improve fuel efficiency of goods transport (2 MT)

Proposed Next Steps (12 MT)

- Consumer action to improve vehicle efficiency, including off-road vehicles (0.8 MT)
- Increasing the target for ethanol blending to 35 percent of gasoline supply, and setting a target of 500 million litres of biodiesel in use by 2010 (2 MT)
- Increased use of public transit, alternative approaches to passenger transportation and sustainable urban planning (7 MT)
- More efficient goods transport, including intermodal (2.3 MT)

Transportation: Background and Details on Next Steps

We live in a highly mobile society. Canadians have come to rely on their vehicles for basic transportation needs. Fast, efficient freight transportation moves goods to markets in a timely manner while providing jobs and supporting our international trade. However, all of these activities – both personal and commercial – produce significant amounts of greenhouse gases.

Section IV of this Plan will provide greater detail on how individual Canadians can help reduce greenhouse gas emissions. It is sufficient to note here that the choices Canadians make in the vehicles they drive and the frequency of their use can make a dramatic difference in the amount of greenhouse gases emitted into the atmosphere. For example, a typical late model sport utility vehicle driven 20,000 km a year produces about 6 tonnes of carbon dioxide, compared to 4 tonnes for a recent mid-sized sedan, and just 2 tonnes for a gasoline-electric hybrid vehicle.

To support Canadians in making more informed choices, this plan proposes working with other governments and the private sector to provide better information and a wider selection of products and services.

In the commercial sector, freight transportation decisions are made in a complex business environment that imposes different requirements for speed, reliability and types of service (e.g., refrigerated goods) and depends on a wide range of factors including distance, door-to-door costs and access to infrastructure.

Given that freight activity is expected to increase by 60 percent by 2020, increasing fuel efficiency within each mode and better integrating freight services to make greater use of low-emission vehicles and modes will be critical to meeting Canada's climate change objectives.

Vehicles and Fuels

Actions Underway

The Motor Vehicle Fuel Efficiency Initiative in Action Plan 2000 targets a 25 percent improvement in new vehicle fleet fuel efficiency by 2010. This improvement is possible with existing technologies and technologies that are expected to become available in this decade. To that end, the Government of Canada will negotiate targets for the introduction of more fuel-efficient vehicles into the Canadian market with automotive manufacturers. Though federal legislation to enforce fuel efficiency standards does exist, it has not been proclaimed or brought into effect, because industry has, in the past, met or exceeded required standards voluntarily.

The Future Fuel Initiative will increase ethanol fuel use in vehicles from the current level of 240 million litres per year to 1 billion litres in 2010, enough ethanol to blend into 25 percent of Canada's gasoline. This measure builds on the current federal and provincial excise tax exemptions on the ethanol portion of gasoline, as well as federal funding for research and development and the use of ethanol in the federal fleet.

What are biofuels?

Biofuels are fuels made from biological products. Two examples are ethanol and biodiesel. Ethanol is a commercial alcohol that is made today from grain. It can also be made from cellulose fibres such as straw, but this is a new approach and is still under development. Taking all factors into account during its production and use, ethanol from grain has about 40 percent fewer GHG emissions than gasoline, and cellulosic ethanol has about 80 percent fewer emissions than gasoline. Ethanol can be blended up to 10 percent with gasoline and used in cars without modification. Biodiesel is a diesel fuel substitute that can be made from a variety of vegetable oils and animal fats (e.g., recycled cooking greases). It can be blended with diesel, resulting in lower GHG emissions.

The automotive industry, fuel providers, system integrators and many others have invested hundreds of millions of dollars in furthering research and development of fuel cell vehicles and other fuel cell and hydrogen technologies. Through Action Plan 2000, we are initiating four demonstration projects that will allow both government and industry to learn more about the kind of infrastructure that would be required to fuel these vehicles and further the development of the hydrogen economy in Canada.

What are fuel cells?

Fuel cells generate electricity by a reaction that converts hydrogen and oxygen into electricity and heat. They are similar to a battery that can be recharged while power is being drawn from it. Instead of recharging using electricity, however, a fuel cell uses hydogen and oxygen. One of its great appeals is that it generates electricity very efficiently and, depending on the source of hydrogen, with very little or no pollution.

Next Steps

The Government of Canada renews its commitment to working with the automotive manufacturers to develop a new fleet efficiency goal. Our objective is to improve fleet fuel efficiency by 25 percent by 2010 and to take additional steps to encourage consumer demand for more efficient vehicles. This plan proposes a further 2.8 MT reduction in emissions from vehicles and fuels through the following initiatives.

Consumer action on vehicle efficiency, including off-road vehicles (0.8 MT)

To assist consumers in making the best environmental choices, we will enhance public information programs. A new vehicle ranking system, similar to the ENERGY STAR® system currently used on consumer appliances, will be introduced, and could provide information on the "carbon burden" or life cycle carbon emissions from different vehicles. Targeted campaigns to reduce fuel use by improving vehicle maintenance and modifying driving practices will also be considered.

Significant reductions in emissions can also be achieved from off-road gasoline-powered products such as outboard motors and snowmobiles, as well as from diesel-fuelled commercial equipment such as farm tractors, logging equipment and construction machinery. This Plan proposes to promote more energy-efficient choices for emissions from consumer gasoline-powered products and diesel-fuelled commercial equipment through voluntary agreements with manufacturers. Other measures, such as regulatory options, could also be considered.

Increase target for ethanol blending to 35 percent of gasoline supply or develop a standard for a greenhouse gas free portion of gasoline (0.9 MT)

At its recent meeting, the Council of Energy Ministers agreed that the federal/provincial/territorial Ethanol and Biofuels Working Group would conduct an analysis of issues and options related to expanding ethanol production. Manitoba and Saskatchewan have expressed interest in a national mandate.

All provinces and territorial governments agreed, in their statement of principles of October 28, 2002, that the Plan must include an incentive and allocation system that supports ethanol, among other low-carbon emissions sources of energy.

While Action Plan 2000 proposed the goal of a 10 percent ethanol blend (E-10) in 25 percent of the national gasoline supply, the Government of Canada will work with provinces, territories and stakeholders to increase this target to 35 percent E-10. Alternatively, there could be a standard for a certain percentage of fuel to be greenhouse gas free, which would encourage the development of cellulosic ethanol. Cellulosic ethanol has an even lower greenhouse gas content than grain-based ethanol, and this technology could become commercially viable in the next few years. Grain-based ethanol will play an important role in increasing ethanol content in the near term, while cellulosic ethanol offers considerable promise for significantly reducing greenhouse gas emissions in the longer term.

Target of 500 million litres of biodiesel by 2010 (1.1 MT)

Biodiesel has potential to reduce greenhouse gas emissions, particularly in the trucking industry. Ontario has already announced its intention to exempt biodiesel from the 14.3 cents per litre provincial tax.

To further encourage the development of biodiesel, this Plan proposes that federal, provincial and territorial governments collaborate on how to reach a target of 500 million litres of biodiesel production by 2010 using a variety of tools including incentives, standards, and research and development.

Passenger Transportation

Actions Underway

Action Plan 2000 established the Urban Transportation Showcase Program, through which all levels of government can work to demonstrate the potential of innovative, integrated and sustainable transportation practices in our cities. This is a nation-wide program that will bear fruit over the next five years, helping Canada manage growth in local transportation demand and establish a supportive framework for public transit investments.

Many municipalities are already taking action on measures to combat greenhouse gas emissions, congestion and health impacts related to the growth in urban traffic. There are also private-sector and non-governmental initiatives, such as commute-reduction and car-sharing programs, that can reduce greenhouse gas emissions.

Next Steps

Increased use of public transit, alternative approaches to passenger transportation and sustainable urban planning (7 MT)

In keeping with its commitment in the Speech from the Throne regarding modern infrastructure and a new strategy for a safe, efficient and environmentally responsible transportation system, the Government of Canada proposes to place a greater emphasis on public transit in existing and future infrastructure funding. This would be done in conjunction with municipal efforts to establish supportive transportation management and land-use planning frameworks, and significant provincial and territorial actions to increase demand for public transit and reduce single-occupant vehicle use.

Potential actions include mechanisms to give traffic priority to public transit, and strategic management of the supply and pricing of parking facilities and roads. Municipalities can also improve infrastructure for non-motorized transportation, through the creation of walking and biking paths.

Under these conditions, investments in transit infrastructure and services could reduce emissions by up to 3 MT. Actions by other levels of government, such as described above, could achieve a further 2.5 MT. Increased speed limit enforcement by provinces could also reduce emissions by about 1.5 MT.

Passenger transportation is an area in which partnership between different levels of government is essential. Important opportunities to reduce emissions from passenger travel are shared among federal, provincial, territorial and municipal governments.

Goods Transportation

Actions Underway

The Action Plan 2000 Freight Efficiency and Technology Initiative was launched in November 2001, to promote greater efficiencies in the way goods are transported within Canada and to other countries. Working with the provinces, territories and industry, the Government of Canada is negotiating voluntary performance agreements, developing education and awareness programs and launching demonstration projects within all modes of transportation.

Provinces are also taking initiatives in this area, as demonstrated by Quebec's mandatory inspection and maintenance program aimed at reducing greenhouse gas emissions and smog from heavy duty vehicle use.

Next Steps

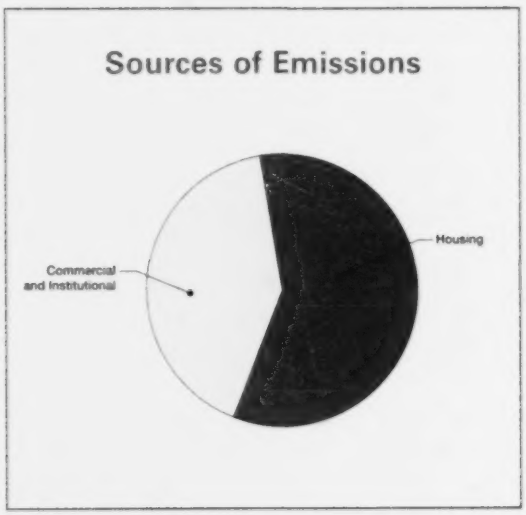
Opportunities for intermodal freight movement (1 MT)

This Plan proposes further public-private collaboration to promote the use of intermodal freight opportunities and to increase the use of low-emission vehicles and modes. This could be done through support for improvements in infrastructure, greater use of intelligent transportation, identification and removal of barriers to intermodal freight, harmonization of national and international standards, and showcasing of best practices and new technologies.

Continued efficiency improvements (1.3 MT)

Through negotiations with associations and industry, as well as new education and awareness tools, the goal outlined in Action Plan 2000 for freight efficiency improvements could be increased by 1.3 MT.
In particular, governments could work with industry and service providers to encourage the purchase and installation of equipment that could cost-effectively reduce emissions. Examples include anti-idling systems for rail and truck services, on-board tire inflation technologies and aerodynamic drag reducers. Action to reduce emissions can be stimulated through technical workshops and publications, preventive maintenance programs, and fuel management practices tailored to commercial vehicles and to municipal partners with responsibility for facilitating the movement of urban goods.

B. Housing and Commercial/Institutional Buildings: Summary



The energy Canadians consume in their homes and workplaces creates greenhouse gas emissions when it involves the combustion of fossil fuels. In addition to direct emissions of 77 MT in 2000, energy consumption in buildings accounted for 57 MT of emissions from the generation of electricity from coal, oil or natural gas.

Emissions from energy consumption in buildings can be significantly reduced through improved energy efficiency, both in the construction of new buildings and the retrofit of existing ones. In the shorter term, the greatest energy efficiency gains will come from retrofitting existing buildings, but better building standards for new construction will reduce emissions over the longer term.

Actions Underway (4 MT direct plus 2.7 MT indirect)

- Making existing buildings more energy efficient (1.2 MT)
- Energy efficiency evaluations for homeowners (0.7 MT)
- Improved standards for equipment and appliances (1.6 MT)
- Energy efficiency improvements to federal buildings (0.2 MT)

Proposed Next Steps (4 MT)

- Target R2000 energy efficiency for all new housing by 2010 (0.7 MT)
- Energy efficiency retrofit of 20 percent of housing by 2010 (1.5 MT)
- New commercial/institutional buildings to 25 percent better than the existing Model National Energy Code for Buildings by 2010 (0.4 MT)
- Energy efficiency retrofit of 20 percent of commercial and institutional buildings by 2010 (1.2 MT)

Housing and Commercial/ Institutional Buildings: Background and Details on Next Steps

Residential Housing

Well designed and operated, energy-efficient houses cost less to heat and cool and provide cleaner indoor air. They also offer new opportunities for promoting Canadian technologies and the jobs associated with those technologies. High efficiency gas furnaces and energy-efficient heat recovery ventilators are just two examples of cutting-edge technologies developed by Canadians.

Actions Underway

Energy efficiency programs have already been implemented by various levels of government and by utilities. The EnerGuide for Houses initiative, which subsidizes professional home energy audits, is a good example of governments working in partnership.

The R2000 Standard for new house construction was developed in collaboration between the public and private sector in the early 1980s. It sets a standard for energy efficiency in construction that is regionally sensitive, taking into account local weather conditions. Ten thousand houses have been built to this standard and R2000 practices have contributed to a 20 percent improvement in the energy efficiency of the overall stock of new housing.

The Action Plan 2000 programs are listed under "Actions Underway" on the previous page and provide estimates of the direct emissions reductions that will result from them. An additional 2.7 MT in indirect emissions reductions is projected to occur as a result of reduced demand for electricity.

The Yukon Housing Corporation offers reduced-rate mortgage financing for homes built or upgraded to the Corporation's energy efficiency standard. Nova Scotia has a program in place to demonstrate and promote new sustainable building practices and Manitoba has an R2000 Home Program.

Next Steps

Energy efficiency retrofit of 20 percent of housing by 2010 (1.5 MT)

This Plan proposes the goal of energy efficiency retrofits for 20 percent of housing by 2010. Cost shared audits and information for homeowners under the EnerGuide for Houses initiative will be expanded. Financial incentives for retrofits will also be explored.

Target R2000 energy efficiency for all new housing by 2010 (0.7 MT)

This Plan proposes that governments and the building sector work towards the goal of having all new housing built to the R2000 standard by 2010. This could be achieved through actions to promote wider penetration of energy-efficient construction practices and products in the building community and their adoption on the market. The goal would be to enable provinces to incorporate the R2000 standard or equivalent level into building codes by 2010.

Commercial/Institutional Buildings

The commercial institutional building stock is made up of health and education facilities as well as retail, office, hospitality and multi-unit residential properties. Increasing the number of energy-efficient buildings can lower energy costs for businesses, residents and governments.

Actions Underway

Natural Resources Canada's Commercial Building Incentive Program (CBIP) provides a financial incentive to owners who incorporate energy-efficient measures into the design of new buildings provided the design exceeds the requirements of the Model National Energy Code for Buildings (MNECB) by at least 25 percent. Over 200 buildings have qualified for the program to date, covering more than one million square metres of floor space. The University of Ottawa Biology Building is in the CBIP, and exceeds the MNECB by 73 percent, generating annual energy savings of $188,000.

The Energy Innovators Initiative is helping over 700 building owners invest in energy-saving retrofits by providing financial incentives, information, advice, audits and planning assistance. Currently, 18 percent of the existing commercial stock has implemented energy- and emissions-saving projects resulting in millions of dollars in energy savings.

The Better Building Partnership in Toronto is an example of innovative public-private partnership to promote retrofits in commercial and institutional buildings.

Actions by governments to reduce emissions from their own buildings are described in Section IV.

Next Steps

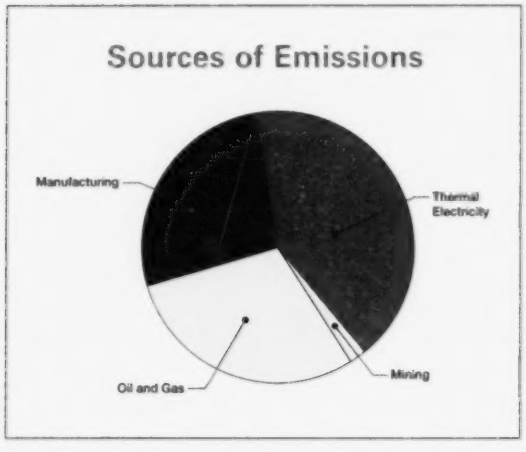
New buildings to be 25 percent better than the existing Model National Energy Code for Buildings by 2010 (0.4 MT)

This Plan proposes that all new commercial and institutional buildings be 25 percent better than the MNECB by 2010. Governments and the private sector would work together, through programs like the CBIP, towards this goal.

Energy efficiency retrofit of 20 percent of buildings by 2010 (1.2 MT)

This Plan proposes the goal of retrofitting 20 percent of the commercial and institutional buildings stock to higher energy efficiency levels by 2010. This could be achieved through collaboration between provincial/territorial governments, municipalities, Aboriginal people, non-governmental organizations, trade associations and the private sector. Commercial and institutional building owners would be consulted on how to encourage retrofits. They can contribute, for example, through the formation of buyers groups to reduce price and risk in the acquisition of new technologies and products.

C. Large Industrial Emitters: Summary



The Large Industrial Emitters include firms in both upstream and downstream oil and gas sectors, electricity generation, and mining and manufacturing, such as cement plants and iron and steel mills. They are expected to produce about half of Canada's total greenhouse gas emissions by 2010.

These enterprises supply energy and other essential products to Canadians and make a substantial contribution to our economy, including through exports. As part of the process of producing energy and other products, greenhouse gas emissions are created. Enterprises in these sectors have been active proponents of improved environmental performance, and have made considerable strides in improving the emissions intensity of their production. The Voluntary Challenge and Registry, Quebec's ÉcoGESte and the Canadian Industry Program for Energy Conservation (CIPEC) have been important mechanisms for supporting and stimulating these efforts. At the same time, output in some of these sectors has been growing rapidly, leading to growth in emissions.

Actions Underway (25 MT)

- Action Plan 2000 programs to support emissions reductions in the industrial sectors

Proposed Next Steps

- Targets for emissions reductions established through covenants with a regulatory or financial backstop (55 MT)
- Emissions trading and access to and facilitation of domestic offsets and international credits
- Complementary actions promoting innovation and technology (11 MT - see Section III.D)

Large Industrial Emitters: Background and Details on Next Steps

The large industrial emitters are in three main sectors: thermal electricity, oil and gas, and mining and manufacturing.

In the electricity sector, greenhouse gas emissions can be reduced through greater reliance on cleaner sources of energy for generating electricity, more efficient generation of that electricity and more efficient use of electricity by consumers.

Low-emissions sources of electricity already play a significant role in Canada's energy mix. These include hydro-electricity and nuclear power. There are also emerging renewable sources, such as wind, that currently account for only a small percentage of our supply of electricity, but which could play a much larger role over time.

In addition, there are emerging technologies for reducing the emissions from electricity generated from coal. Such technologies are of particular interest to Canada, given our abundant resources of coal.

In the oil and gas sector, there is potential for reducing emissions by lowering the emissions intensity of oil and gas production and distribution. For example, reducing the leakage of methane from natural gas pipelines and reducing the use of energy in oil sands production could cut emissions and costs, depending on the size of the investment required and the payback period. This industry is well underway in achieving these kinds of emissions intensity reductions. Over the past decade, for example, the oil sands sector was a key driver of economic growth, investing $21 billion and creating 100,000 jobs, while at the same time reducing its emissions intensity by 26 percent.

The mining and manufacturing sector is highly diverse, but emissions generally fall into two categories: those arising from the combustion of fossil fuels for energy or heating, and those from industrial processes in which greenhouse gases are emitted as a direct by-product of those processes. There have been some notable areas of success in reducing emissions in this sector, largely due to emissions mitigation technologies and increased energy efficiency. A continuation of these trends would further reduce emissions.

Actions Underway

Canada's Climate Change Voluntary Challenge and Registry Program (VCR Inc.) was established in 1997 to encourage voluntary action by large companies to reduce their greenhouse gas emissions by documenting Action Plans, best practices and achievements. There are 907 organizations currently registered with VCR Inc., covering virtually all large industrial emitters. More than 80 of the organizations registered are from the oil and gas sector. Many of these are Champion Level Reporters. Quebec has a similar voluntary program called ÉcoGESte.

The Canadian Industry Program for Energy Conservation (CIPEC) is another industry-government partnership that promotes action to reduce emissions. Established 27 years ago, CIPEC provides a forum for industry to set voluntary targets, exchange information and work with government to develop the tools and services needed to improve energy efficiency. Companies under the CIPEC umbrella averaged an energy intensity improvement of 2 percent per year between 1990 and 1999.

In Action Plan 2000 and Budget 2001, the Government of Canada committed an additional $370 million over five years to support the reduction of greenhouse gas emissions in the industrial sectors. The largest amount was support for wind energy production, with further funds for audit programs, bench-marking initiatives and CO_2 capture and storage projects.

Next Steps

This Plan proposes a comprehensive approach for the large industrial emitters, in keeping with their key role in Canada's economy and their substantial share of emissions.

Although no final targets have yet been determined, there are ongoing discussions with industry representatives on the role these sectors will play in contributing to Canada's Kyoto objectives. As the chart below indicates, the large industrial emitters are forecast to contribute almost 50 percent of Canadian emissions by 2010.

The Plan proposes a three-pronged approach to the large industrial emitters:

- targets for emissions reductions established through covenants with a regulatory or financial backstop (55 MT);
- access to emissions trading, domestic offsets, and international permits to provide flexibility; and
- complementary measures, including cost-shared investments in innovative technologies to reduce emissions (11 MT – see next section on Renewable Energy and Cleaner Fossil Fuels).

In all its work with the large emitters, the Government will seek to design measures that are effective in encouraging lower emissions, that are administratively efficient and clear, and that maintain the competitiveness of Canadian industry.

Covenants and Emissions Trading

Industry has expressed interest in covenants as an approach that may lend itself more readily to dealing with individual sector circumstances than a purely regulatory approach. The United Kingdom has used covenants for implementing emissions reductions and emissions trading. Companies or sectors that enter into these agreements and comply with them are then exempted from the climate change levy.

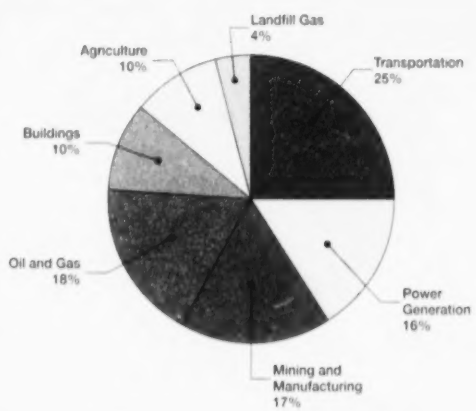
Sectors proposed for inclusion on the basis of emissions intensity

- thermal electricity generation (coal, oil and gas)
- oil and gas (upstream extraction, oil and gas pipelines, gas utilities, petroleum refining)
- mining (both metal and non-metal)
- pulp and paper production
- chemical production (industrial inorganic chemicals, industrial organic chemicals, and chemical fertilizers and fertilizer materials
- iron and steel production
- smelting and refining
- cement and lime production
- glass and glass container production

What is an offset?

When emissions reductions in sectors not covered by an emissions trading system are sold into that system, these reductions are called "offsets" because they offset emissions generated by industries in the emissions trading system. This Plan proposes that the forestry, agriculture and possibly landfill sectors be permitted to sell offsets into the emissions trading system. For example, the mass planting of trees, which acts as a carbon sink, could generate an offset that could be traded to another company looking to reduce its emissions. Since these emissions reductions would offset emissions reductions that would otherwise be required of large industrial emitters, they would not lead to more emissions reductions in Canada overall. The advantage of offsets is that they could provide alternatives for reducing emissions to the large industrial emitters, and a market mechanism for stimulating emissions reductions in other sectors.

Emissions by Sector in 2010



Alberta suggests in its plan that sector agreements would be backstopped by regulation or financial consequences for non-participation. Whatever the approach finally determined, the Government of Canada will work with industry to ensure that covenants with a regulatory or financial backstop are a central element of the Canadian strategy to reduce industrial emissions.

Covenants will take account of the competitiveness issues in each sector and could address a number of elements, such as emissions intensity undertakings, technological investments and any other initiatives to reduce emissions, as well as partnership activities.

As noted in Section II, emissions trading is a market mechanism that could provide flexibility for industry in meeting its target. The options under discussion with industry would require companies to have permits to cover their emissions. A large proportion of the expected permit requirements would be provided free to companies, based on their level of production and an emissions intensity factor. Companies would then have a choice with respect to their remaining permit requirements. They could invest in emissions reductions or purchase permits or offsets, or a combination of both.

Under an emissions intensity approach, permits received by a firm would grow or shrink based on production. Firms with lower emissions intensity in a given sector would need to purchase fewer permits or may even have surplus permits. While the system would provide incentives to reduce emissions, it would not place an absolute cap on industry's or any firm's emissions. There are various options for establishing the emissions intensity factor for a sector, including actual performance in a defined period or a technical and economic assessment of emissions reductions possibilities for the sector. The Government will continue discussions with industry and provincial and territorial governments to ensure the approach taken on emissions intensity is reasonable and the targets achievable.

Table 4: Illustrative Costs for Selected Industries with 85 Percent Free Permit Allocation (at $10/Tonne Carbon Price)

Sector	$ per Unit	Cost as % of Price	Sector	$ per Unit	Cost as % of Price
Conventional Oil ($/barrel)	0.03	0.09	Electricity-Coal (c/KWHr)	0.14	1.94
Heavy Crude Oil ($/barrel)	0.015	0.05	Electricity-Oil (c/KWHr)	0.12	1.57
Oil Sands-Bitumen ($/barrel)	0.10	0.34	Electricity-Gas (c/KWHr)	0.04	0.60
Oil Sands-Synthetic ($/barrel)	0.12	0.31	Cement ($/tonne)	1.18	1.18
Natural Gas ($/mcf)	0.005	0.14	Lime ($/tonne)	1.85	2.50
Pipelines ($/mcf)	0.0014	Not avail.	Pulp and Paper ($/tonne)	0.59	0.06
Refined Petrol Products ($/$m^3$)	0.17	0.03	Aluminum ($/tonne)	4.73	0.23
Steel-Conventional ($/tonne)	2.10	0.29	Industry Chemicals ($/tonne)	0.31	Not avail.
Steel-Electric Arc ($/tonne)	0.60	0.08	Agriculture Chemicals, Fertilizers, etc. ($/tonne)	2.63	1.46

To give a sense of the possible order of magnitude of impacts on industry, Table 4 presents illustrative direct costs for selected industries, based on an option of 85 percent free permit allocation and hypothetical emissions intensities for sectors in 2010. It assumes that all the necessary emissions reductions are purchased or achieved at $10 per tonne. For a few industries, such as coal-fired power generation, cement and the lime industry, cost is more significant, potentially raising competitiveness issues. For most industries, however, the impact is less than 1 percent of unit price. The table is for illustrative purposes only and costs for sectors could differ significantly using alternative methodologies.

Addressing Industry's Concerns

Industry has a particular concern about the extent of risk that an emissions permit regime might expose it to. On quantity, it has asked whether it might face further targets as part of the remaining 60 MT towards the estimated gap of 240 MT. The Government recognizes the need for clarity and agrees that the target under emissions trading will not be more than 55 MT. Any amounts beyond that target would be achieved through incentives.

The Government also recognizes concerns that there may be exceptional circumstances where the ten-year time frame from now to 2012, which is the end of the first commitment period under the Kyoto Protocol, is too short to allow for needed technology development and strategic capital turnover. The Government is prepared to discuss an approach whereby a pre-approved commitment of larger emissions reductions over the somewhat longer term could be accepted in lieu of reductions in the nearer term. Any approach of this nature would need to bear in mind the restoration rate for Parties under the Kyoto Protocol.

On price, industry has asked whether it might be provided protection in the event that the international carbon price is very high. While industry should assume its normal responsibility for managing risks associated with price fluctuations, the Government will work with industry on options for providing protection against risks associated with sustained carbon prices above certain levels.

Finally, there have been questions around recognition for early action in emissions reductions by companies or sectors. A joint industry-government group did extensive work on this issue in 1999 and concluded not to recommend that a formal system of credits be put in place, partly because of the complexities of the issue. In 2000, federal and provincial energy and environment ministers endorsed the principle that companies that take early action should not be disadvantaged by an output-based emissions regime. The Government will continue to work with industry to design a system that will not disadvantage those firms that have taken early action.

Consultations

Discussions will continue with industry, provincial and territorial governments and other stakeholders with the intention of arriving at a general approach to industrial emissions reductions in the early months of 2003. It is expected that the details of the system will then be developed in the 2003-2004 period and implemented as soon as possible thereafter.

D. Renewable Energy and Cleaner Fossil Fuels: Summary

Increased use of renewable energy and demonstration of innovative new technologies for cleaner fossil fuels can contribute both to meeting Canada's Kyoto target and to getting Canada's industrial sector on a longer-term lower emissions intensity path. Innovation in these areas can also create significant economic opportunities for Canadian companies. Partnerships between governments and the private sector are an important tool for success.

Actions Underway (12 MT)

- An incentive for wind power production (2.8 MT)
- Green power purchases for 20 percent of the Government of Canada's electricity needs (0.2 MT)
- Cooperation with provinces to reduce barriers to interprovincial electricity trade and transmission (5.4 MT)
- A CO_2 capture and storage initiative (3.5 MT)

Proposed Next Steps (10.6 MT)

- Target 10 percent of new electricity generating capacity from emerging renewable sources (3.9 MT)
- Identify and develop options to address impediments to new regional hydroelectricity transmission and generation capacity
- Demonstrate clean coal technology (4.5 MT)
- Establish a CO_2 capture and storage pipeline (2.2 MT)

Renewable Energy and Cleaner Fossil Fuels: Background and Details on Next Steps

Renewable Energy

An increase in the production and use of renewable energy will be key to meeting our climate change objectives. Renewable energy includes hydroelectricity, which is already widely in use in Canada, as well as emerging sources of renewable energy such as wind, solar and biomass.

Actions Underway

A number of provinces have already demonstrated leadership by undertaking initiatives or setting targets that will increase the overall share of electricity generated from emerging renewable energy sources. For example, BC Hydro will meet at least 10 percent of its new electricity requirements from emerging renewable sources by 2010; the Quebec government will double its target to purchase 100 megawatts of wind-generated electricity; and Saskatchewan and Prince Edward Island have committed to purchasing wind-generated electricity for government facilities.

The Government of Canada provided $260 million for the Wind Power Production Incentive in Budget 2001. This will directly support the creation of 1,000 megawatts of wind energy capacity during the next five years. In addition, the Market Incentive Program in Action Plan 2000 provides financial incentives to electricity distributors to offer "green" power to their residential and small-business customers.

Action Plan 2000 set out the goal of reducing undue impediments to the development of Canada's hydroelectric potential and of transmission capacity to deliver this energy to Canadian markets, while maintaining federal and provincial environmental standards. The Government of Canada cooperated with provinces and industry on a study of the potential to develop Canada's hydroelectric resources and transmission capacity. This work was carried out under the auspices of the Council of Energy Ministers and was considered by Ministers in September 2002. Discussions have also been initiated with interested federal departments and agencies on the potential to continue to improve federal regulatory processes affecting hydroelectric and transmission development in Canada. It has been estimated that the accelerated availability of additional transmission capacity and hydroelectricity to Canadian markets could reduce emissions by approximately 5.4 MT by 2010, with greater potential in the longer term.

Next Steps

Provinces and territories noted in their statement of principles of October 28, 2002, the importance of creating incentives for lower- or no-emissions sources of energy. The proposed emissions trading system for large industrial emitters will do this, given that no-emissions sources will not have permit requirements. The following steps are additional ways in which lower- or no-emissions sources can be promoted.

Target 10 percent of new electricity generating capacity from emerging renewable sources (3.9 MT)

The Plan sets the target of at least 10 percent of new electricity generating capacity in Canada to come from emerging renewable sources. This could be achieved in a number of ways, including expanded production incentives, renewable energy portfolio standards in provinces, increased efforts to develop market demand, as well as the stimulus provided by the proposed emissions trading system. A federal-provincial working group is examining how renewable portfolio standards could work in the Canadian context.

Consumers can play a role by asking their utilities to supply them with emerging renewable energy. Utilities in five provinces currently offer emerging renewable power options and three more are considering doing so. The higher price charged helps support the development of additional emerging renewable power.

The Government will cooperate with the Canadian Electricity Association on the development of an electricity labeling scheme indicating the relative environmental impact of different electricity generating sources. The federal "green power" guideline will include a review process for low-impact, large-scale hydro projects to qualify for the logo.

Identify and develop options to address undue impediments to new regional electricity transmission

The Council of Energy Ministers instructed officials across governments and departments to develop terms of reference for an expanded analysis to identify institutional, regulatory and economic constraints to new regional transmission development in Canada, and to set out options to address these constraints. This work is to take into account the evolving competitive and integrated nature of North American electricity markets.

Cleaner Fossil Fuels

CO_2 Capture and Storage in the Oil and Gas Sector

CO_2 capture and storage is a technique that is capable of playing a major role in reducing Canada's greenhouse gas emissions while enabling Canada to make use of its abundant fossil fuel resources. It involves the "capture" of CO_2 from sources such as fossil-based electricity generation, oil sands production and industrial processes such as fertilizer plants, before the CO_2 is emitted to the atmosphere. The CO_2 can then be injected deep underground, either in oil and gas reservoirs, coal beds or deep aquifers.

Companies are already injecting CO_2 into oil reservoirs as a means of forcing out oil that would otherwise be unrecoverable. This technique is referred to as Enhanced Oil Recovery (EOR). CO_2 can also be injected into coal beds that are too deep underground to be mined. The CO_2 forces methane out of the coal bed, and that methane can be used as an energy source (natural gas) or used to produce hydrogen for fuel cells that can power vehicles and buildings.

Actions Underway

Both the Government of Canada and the governments of Alberta and Saskatchewan are actively working to encourage CO_2 capture and storage projects.

A CO_2 capture and storage initiative was developed under Action Plan 2000 to advance the understanding of the technique. The Government of Canada is working with provinces, territories and industry to design and implement the financial incentive program to sequester the CO_2 into long-term storage through specific enhanced oil recovery projects. The initiative also includes the International Energy Agency's Weyburn CO_2 Monitoring Project in Saskatchewan, a $42 million, four-year international effort to enhance the understanding of geological storage of CO_2 associated with enhanced oil recovery.

Current efforts are aimed at establishing CO_2 capture and storage projects involving EOR within the next two to three years.

Over the long term, 50 MT per year could potentially be captured and stored. Realizing this potential would require further developments in the technology for capturing the CO_2 (which is the most technologically demanding part of the approach) as well as the technology for injecting CO_2 in coal beds and deep aquifers, and a reduction in the associated costs.

A crucial element for putting CO_2 capture and storage to work is the means to transport CO_2 from where it is captured to where it can be injected underground, in quantities sufficient to achieve economies of scale unavailable to individual projects.

Next Steps

Establish a CO_2 capture and storage pipeline (2.2 MT)

The Government of Canada is prepared to work with provinces and the private sector to explore the transportation needs associated with CO_2 capture and storage as proposed in the Alberta plan, including consideration of a suitable proposal for the construction of the backbone of a capture and storage pipeline system. This, in turn, could further accelerate the development of an effective CO_2 capture and storage market.

Clean Coal Technology

CO_2 emissions from coal-fired electricity generation account for nearly 100 MT of Canada's annual greenhouse gas emissions, principally from Alberta, Saskatchewan, Ontario and Nova Scotia. A number of technologies are under development that offer the opportunity to capture the CO_2 from coal-fired plants, making the CO_2 available for storage or use.

In a conventional coal-fired electricity generation station, the emissions contain about 15 percent CO_2. A number of approaches are being developed that could remove the CO_2, as well as other pollutants. The captured CO_2 could then be compressed, transported and injected into a geological reservoir.

Actions Underway

Work on developing technologies to effectively capture CO_2 is underway in a number of countries, with some of the leading work being done in Canada. There are a number of technologies at, or near, the demonstration stage that can capture the CO_2 and other pollutants emitted by coal-fired electricity generating stations.

To explore this opportunity, the Canadian Clean Power Coalition (CCPC) has been formed by Canada's coal-burning electrical utilities and coal producers. With funding from the Government of Canada, the governments of Alberta and Saskatchewan and a number of others, this consortium is assessing the technology options for commercial demonstrations on a retrofit of an existing plant and on the construction of a new generating station.

Next Steps

Demonstrate clean coal technology (4.5 MT)

The Government of Canada is prepared to consider participation in suitable clean coal demonstration projects, whether through the retrofit of an existing plant and/or the construction of a new generating station. A Canadian retrofit project would likely be the first of its kind in the world.

A new plant demonstration could draw on the experience from demonstration plants already built or anticipated in other countries, although a Canadian demonstration would need to address the special characteristics of Canadian coals (moisture and ash content). Both projects would be of tremendous interest internationally. Technical and financial involvement would be solicited from other countries.

E. Small and Medium-Sized Enterprises and Fugitive Emissions: Summary

Emissions from small and medium-sized enterprises (SMEs) and fugitive emissions in the oil and gas sector would not be covered by the proposed emissions trading system.

Energy efficiency improvements in SMEs help reduce emissions and lower energy costs for these businesses.

Fugitive emissions are not proposed for inclusion in emissions trading because of difficulties with precise measurement. However, there is considerable scope for reducing these emissions through best technologies and practices.

Actions Underway (2 MT)

- Improvements in industrial energy efficiency in sectors not covered by the proposed emissions trading system (2 MT)

Proposed Next Steps (5 MT)

- Extend voluntary targets to SMEs (0.7 MT)
- Continue to work through the Industrial Research Assistance Program (IRAP) to help SMEs reduce emissions
- Further work to reduce fugitive emissions (4 MT)

Small and Medium-Sized Enterprises and Fugitive Emissions: Background and Details on Next Steps

Small and Medium-Sized Enterprises

There are more than 34,000 establishments engaged in general manufacturing (e.g., textiles, wood products, food and beverage, electronics) that would not be covered by the emissions trading system. While this is a diverse group of mostly small and medium-sized enterprises (SMEs), their common characteristic is that they are neither energy- nor emissions-intensive. Together, they account for only about 5 percent of industrial emissions. Inclusion in an emissions trading system is not the most effective way to reduce emissions in this sector, given the diverse nature and small size of firms.

For these companies, emissions can be reduced through thousands of discrete investments in new capital, such as boilers and furnaces, switching fuel and programs of continuous improvement in their operations.

These actions can also result in lower energy costs and improved competitiveness. In addition, they can create a larger market for environmentally friendly goods and services such as advanced heating and cooling systems, micro-cogeneration and energy management control technologies.

Actions Underway

Action Plan 2000 provided funds to start addressing emissions from some of the less energy-intensive companies through audits and information.

Next Steps

Extend voluntary targets to SMEs (0.7 MT)

This Plan proposes to expand the Canadian Industry Program for Energy Conservation (CIPEC) to include voluntary energy efficiency targets for SMEs. Doing so could help reduce greenhouse gas emissions by 0.7 MT by 2010.

CIPEC will help companies implement emissions-reducing investments through cost-shared audits, full process feasibility studies, sectoral bench-marking studies and best practices. Emphasis will be placed on getting the right information directly into the hands of company decision makers.

Continue to provide support to SMEs through IRAP for reducing emissions

The Industrial Research Assistance Program (IRAP) of the National Research Council of Canada will continue to work with Canadian SMEs to reduce emissions, through technical and financial assistance provided through the IRAP network of 260 advisers located in 90 communities across Canada.

Fugitive Emissions

Fugitive emissions come mainly from the releasing or burning (flaring) of waste gases during oil and gas production and exploration, as well as from small leaks in natural gas equipment, lines and storage tanks. They account for 7 percent of Canada's total greenhouse gas emissions.

While some releasing or burning is necessary to depressurize equipment, there are opportunities to reduce such emissions by reducing leaks and losses, recovering waste gas streams, finding new uses for recovered gas and improving combustion efficiency.

Actions Underway

A number of initiatives are already underway to address fugitive emissions. The Alberta Energy Utilities Board, for example, has set aggressive guidelines to reduce all types of burning. Under the Clean Air Strategic Alliance (CASA), the Government of Alberta is working with industry and environmental groups to set voluntary targets to reduce fugitive emissions.

Next Steps

Further action to reduce fugitive emissions (4 MT)

This Plan proposes that consultations be held with industry, the provinces and territories on a target of 4 MT in reductions in fugitive emissions associated with the release or flaring of waste gases as well as from leaks in equipment, lines and storage tanks.

Building on the Alberta approach, this could be achieved through information, demonstrations, regulations and guidelines. Research done in conjunction with industry suggests some 4 MT in reductions would be achievable through leak detection and repair programs, technology demonstration and other support.

F. Agriculture, Forestry and Landfills: Summary

Forests and agricultural soils both absorb and release carbon dioxide through natural processes of photosynthesis and decomposition. When, on balance, they absorb more carbon dioxide than they release, they are net carbon sinks. Forests and agricultural soils in Canada are projected to provide a carbon sink of 30 MT by continuing current management practices, and this sink could be further increased through additional action. Agriculture generates about 60 MT of greenhouse gas emissions (methane and nitrous oxide), while landfills emit about 24 MT (primarily methane).

Agriculture, forestry and landfills are all areas where new activities to reduce emissions and increase sinks represent potential offset credits in a domestic emissions trading system.

Actions Underway (8 MT)

- Promotion of sinks through Action Plan 2000 and the Greencover Canada component in the Agriculture Policy Framework (5.8 MT)
- Green Municipal Funds for landfill methane capture (2.2 MT)

Proposed Next Steps

- Establish a framework to enable new agriculture and forestry sinks (beyond the 30 MT in sinks from existing practices) to be sold as offsets in an emissions trading system
- Consult on whether to regulate emissions reductions from new capture and flaring of landfill gas or allow them to be sold as offsets

Agriculture, Forestry and Landfills: Background and Details on Next Steps

Agriculture and Forestry

Canada's 247,000 farmers manage 68 million hectares of land and millions of livestock. They are among the most productive and innovative farmers anywhere in the world and Canadian farm organizations are leaders in promoting new environmental management techniques with their members. Farmers and governments have worked together to improve farming methods and reduce soil erosion, thereby increasing retention of carbon dioxide in soils. Since 1991, for example, use of low tillage has increased by 350 percent, summer fallow has decreased by 40 percent and hay in crop rotations has risen by 27 percent. Assuming that current practices continue, agriculture is predicted to generate a carbon sink of 10 MT in the first commitment period. There is no upper limit on Canada's agricultural sinks under the Kyoto Protocol.

With respect to forestry, current projections are that existing forest practices will result in a carbon sink of 20 MT. Investments in plantations, policy changes to reduce deforestation and changes in forest management practices, including intensive silviculture and improvements to forest conservation, could significantly add to this sink. Canada's limit for forest management sinks under the Kyoto Protocol is 44 MT.

Actions Underway

Under Action Plan 2000, the federal government is assisting farmers to take action on climate change through a number of initiatives: a shelterbelt program to encourage more planting of trees around farms to absorb carbon dioxide and reduce wind erosion of soil; a Greenhouse Gas Mitigation Program to work with farm organizations to promote climate-friendly practices that improve nutrients, soil and livestock management; and science and technology investments to develop lower emissions technologies.

The Agriculture Policy Framework will promote farm environmental planning to improve management of greenhouse gases. Within this Framework, Greencover Canada is a national initiative to promote sustainable land use and expand the area covered by perennial forage and trees. This initiative will improve management of agricultural land by encouraging conversion of marginal annual crop land to perennial vegetation; improve management of existing forage and range land; protect water quality by enhancing riparian and/or critical wildlife habitat; and enhance integration of shelterbelts into the agricultural landscape.

BIOCAP Canada is bringing together researchers to further scientific understanding of the processes and potential for enhancing forest and agricultural sinks and reducing emissions. The Government of Canada has provided $6 million to support BIOCAP's work.

The combined effect of the various climate change and environmental initiatives for agriculture is estimated to result in another 5.8 MT of emissions reductions and sinks credits during the first commitment period of the Kyoto Protocol.

With respect to forestry, Action Plan 2000 is supporting the Feasibility Assessment of Afforestation for Carbon Sequestration (FAACS) to analyse the potential for large-scale creation of new forests.

The Government of Canada is working with provincial and territorial governments, farmers and foresters to develop the measurement tools and inventories needed to qualify under the Kyoto Protocol for credits for carbon sequestration and emissions reductions.

Next Steps

Establish a framework for offsets

The Plan proposes to establish a framework that will enable agricultural and forestry sinks and emissions reductions to be sold as offsets into a domestic emissions trading system (see Section III.C). Offsets would have to be measurable and go beyond business-as-usual practices. Governments, farmers, foresters and large industrial emitters will need to work together to design the offsets system.

The October 28, 2002 provincial and territorial statement on climate change policy stated that benefits from assets such as forest and agricultural sinks must accrue to the province and territory that owns the assets. The Government of Canada proposes that sinks

credits that accrue from business-as-usual actions will be used to reduce Canada's overall emissions reduction target, in keeping with the principles of minimizing costs to the economy, thereby benefitting all sectors, including forestry and agriculture, and no undue burden in any region of the country. Investments that enhance the business-as-usual sink beyond the estimated 30 MT would produce credits for sale to the benefit of investors and owners through the proposed offset system. This ensures that new and additional sinks credits will have monetary value in addition to the economic reasons that already prevail for pursuing good forestry and agricultural management practices. The Government of Canada will work with all provinces and territories to establish an accurate sinks inventory.

Fast growing, high yield forest plantations could increase the rate of carbon storage in the first commitment period, with even greater results as trees mature in subsequent periods. The Canadian Council of Forest Ministers agreed in September 2002 that this should be the subject of further discussion among federal, provincial and territorial governments. The resulting sustained economic activity would provide increased employment and income diversification for rural and Aboriginal communities across Canada.

Landfills

Canadian landfills generate about 24 MT of greenhouse gas emissions annually, primarily from methane. Currently, an estimated 25 percent of landfill methane is recovered through active collection systems.

Going beyond merely capturing the landfill methane and utilizing it to displace other forms of fuel and/or energy use could further reduce greenhouse gas emissions and result in revenues for developers, industry and municipalities, and in environmental and health benefits.

Actions Underway

The Federation of Canadian Municipalities' Green Municipal Enabling Fund and Green Municipal Investment Fund are pursuing projects to reduce greenhouse gas emissions with provincial, territorial, municipal and private-sector partners. There are currently two pilot landfill gas projects approved under the Green Municipal Investment Fund. Overall it is estimated that initiatives from these funds will reduce landfill emissions by 2.2 MT.

Next Steps

Analyses and inventories suggest that it is feasible to capture an additional 8 MT of landfill methane at relatively low cost.

Consult on whether to regulate landfills or incorporate into an offsets system

The Plan proposes that federal, provincial, territorial and municipal governments consult on whether emissions reductions from new capture and flaring or use of landfill gas should be eligible to be sold as offsets in a domestic emissions trading system, or whether regulation by the appropriate authorities is preferable.

G. International Emissions Reductions: Summary

The Kyoto Protocol creates a new international market for a new global commodity: international emissions permits.

The Plan proposes that Canada participate directly in this international market and seek to do so in close collaboration with the private sector. Our objectives would be to:

- help developing countries reduce their greenhouse gas emissions
- maximize trade opportunities for Canadian goods and services
- help build an effectively functioning carbon market that will allow Canadian firms to purchase international permits at a reasonable price
- help risk-manage Canada's ability to reach its target

Actions Underway

- $15 M investment in the World Bank's Prototype Carbon Fund (2 MT)
- $100 M investment in capacity building activities in developing countries through the Canada Climate Change Development Fund, the majority of which are creating an enabling environment for investment in additional credit-generation projects
- $20 M to enhance Canada's Clean Development Mechanism and Joint Implementation (CDM/JI) Office to facilitate Canadian private sector participation in international projects

Proposed Next Steps (10 MT)

- Consult the private sector on the best approach to work together in support of their investments and purchases on the international market
- Consider the purchase of a minimum of 10 MT of permits by the Government of Canada

International Emissions Reductions: Background and Details on Next Steps

The International Market for Carbon

The Kyoto Protocol creates a new international market and a new global commodity called international emissions permits. Canadian companies are already active players in this market, both buying permits for their own use and generating permits to sell to others. The international market for carbon will be an important means by which countries and companies can reduce global emissions and meet their Kyoto commitments as cost-effectively as possible.

The Kyoto Mechanisms

The Kyoto Protocol includes three market-based mechanisms designed to help industrialized countries achieve their Kyoto targets at the lowest possible cost and to help promote emissions reductions and sinks projects in developing countries and countries with economies in transition (EITs) to a market economy (Russia or countries of the former Soviet Union and eastern Europe). These mechanisms are accessible to countries and companies authorized by countries that have ratified the Protocol.

The first of these is the **Clean Development Mechanism** (CDM), through which Canada or Canadian firms could generate permits by investing in emissions reduction or sinks projects in developing countries that have ratified the Protocol. For example,

methane emissions from a landfill site on the edges of a large city might be used to generate enough electricity for a neighbouring town. Such a project both reduces greenhouse gas emissions and provides a secure energy supply at a reasonable cost – a key ingredient for improving quality of life and creating the potential for sustainable development.

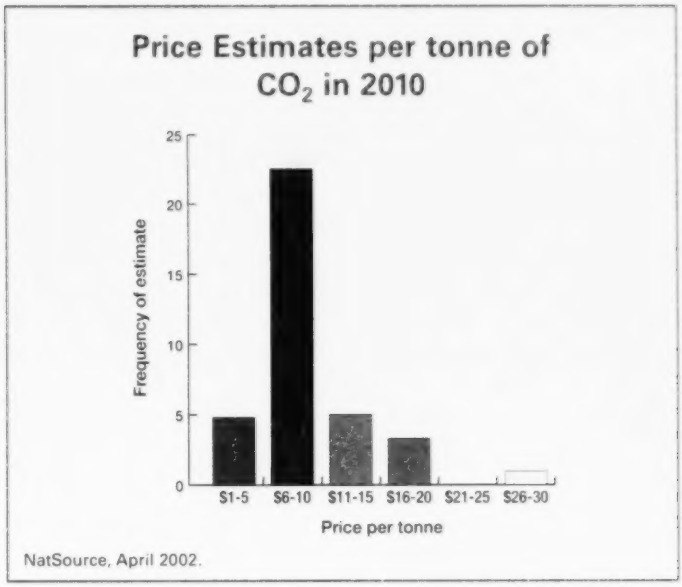
The second mechanism is **Joint Implementation** (JI), through which Canada or Canadian firms could generate permits by investing in emissions reduction or sinks projects in other industrialized countries, including in EITs. For example, Canadian technology might be used to improve the seals and compression pumps on a pipeline in eastern Europe, thereby reducing fugitive emissions. Canada has state-of-the-art expertise and technology in this area that is already finding markets abroad. Reducing emissions from pipelines can lead to improved profitability and improved local air quality.

The third mechanism is **International Emissions Trading** (IET), through which Canada or Canadian firms can buy permits on an open market. The permits could be purchased directly or through an international broker.

One issue that has received considerable attention is the possibility of buying surplus permits from Russia and eastern European countries, where economic decline over the past decade has lowered their emissions below their Kyoto target. The Government of Canada has already indicated that it would buy such permits only if the selling country agrees to invest the proceeds from the sale in projects and activities that contribute to emissions reductions. This is called "greening" surplus permits and ensures that these purchases result in real environmental benefits that contribute to addressing climate change.

Actions Underway

Canadian companies are already investing in projects that are expected to qualify under the Clean Development Mechanism and Joint Implementation. They are making these investments for at least two reasons: these projects are profitable in their own right and the permits they will generate could be used to offset their own emissions or sold to other companies as an additional source of revenue.



To assist Canadian companies to gain access to this market, the Clean Development Mechanism and Joint Implementation (CDM/JI) Office was created in the Department of Foreign Affairs and International Trade. The Office negotiates bilateral agreements with host countries to help secure project approvals and provides technical and funding assistance for market identification studies, feasibility assessments, baselines and monitoring plans, as well as risk assessments and environmental impact studies. These services are aimed at facilitating projects and reducing transaction costs.

The Government of Canada is currently investing in projects that generate permits through a $15 million share of the World Bank Prototype Carbon Fund (PCF). The PCF operates like a mutual fund, pooling the collective resources of a number of countries and companies and investing these funds into projects that reduce emissions or remove CO_2 from the atmosphere and enhance sustainable development. For example, the PCF could invest in an electricity generating station financed from other World Bank funds in order to install more expensive, but also more efficient and cleaner technology. The difference between the CO_2 emissions from the originally proposed generating station and the station that is actually built are the carbon permits that accrue to the Fund.

Next Steps

The Plan proposes that the Government of Canada participate directly in this international market and should seek to do so in close collaboration with the private sector. The Government has four core objectives.

First, there is tremendous potential to create carbon permits while also helping to build the capacity and experience in the developing world to manage and reduce greenhouse gas emissions. As a result, these countries will be better positioned to assume their own emissions targets in the years ahead.

Second, these projects can maximize trade opportunities for Canadian goods and services. It has been suggested that over the next eight years the international carbon market could grow into a US$10 billion market, creating considerable growth potential for Canadian exports.

Third, it is important to ensure that the price of international permits is low and the cost of achieving our Kyoto target is reasonable. By being an active participant in the market, Canada can help to build what is now a thin, fledgling market into a more robust one where there is active permit trading and an ample supply of verified carbon permits.

Fourth, the international permits that the Government buys provide a buffer should the actions that will be taken under this Plan not yield the emissions reductions required for Canada to meet its Kyoto commitment.

Collaborate with Canadian firms in the international market

Canadian companies that would be covered by the proposed covenants and domestic emissions trading system may choose to be active in the international market as a way of offsetting some or all of their domestic emissions. Canadian firms might also decide to be active investors in international emissions reduction projects as part of their overall business operations.

A number of Canadian companies have expressed interest in collaborating with the Government of Canada to enhance their ability to use the Kyoto Mechanisms. Such collaboration could lower transaction costs by pooling private-sector and government expertise and purchasing power. The Government of Canada will consult on how such a collaborative mechanism could be designed.

Consider a minimum purchase of 10 MT of international permits

With the objectives outlined above in mind, the Government of Canada is prepared to consider the purchase of a minimum of 10 MT of international permits, with priority to be given to permits from CDM/JI projects. The Government will ensure that its own participation in the international market complements that of the Canadian private sector.

IV. Canadians, Communities and Governments: Each Doing Our Part

A. A Goal for Canadians

On average, each Canadian generates just over five tonnes of greenhouse gas emissions each year. Together, these account for more than a quarter of Canada's greenhouse gas emissions. Activities such as driving vehicles, heating and cooling homes, washing and drying clothes, and using other appliances all use energy that may be generated by burning fossil fuels. This causes greenhouse gas emissions and also affects air and water quality. By taking small actions at work, at home and on the road, Canadians can reduce greenhouse gas emissions, while reducing air and water pollutants.

Individual Canadians can do their part in achieving our climate change objectives by establishing goals for reducing their greenhouse gas emissions. This Plan proposes an individual target of one tonne, recognizing that some Canadians will have scope to do more and others less.

How much is one tonne of greenhouse gases?

One tonne of CO_2, the main greenhouse gas, would completely fill the inside of an ordinary house.

Achieving this goal would reduce Canada's greenhouse gas emissions by more than 30 MT.

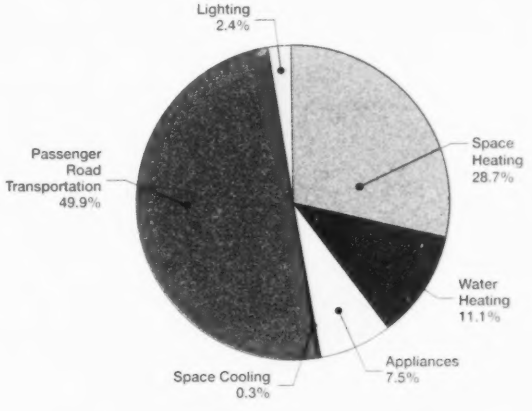
The measures contained in the Plan (see Section III) will help Canadians achieve the one-tonne goal. For instance, the Government of Canada will work with manufacturers to improve new vehicle efficiency, and provide support for increased public transit. Measures in the Plan will help increase the availability and use of ethanol fuel by consumers. For homes, EnerGuide evaluations will be expanded. There is also a goal to have all new houses built to the R2000 energy efficiency standard by 2010.

Canadians need to know what actions they can take, what their impact will be, and how much, if any, investment on their part will be required. This Plan will build on current public education and outreach initiatives to provide Canadians with better information on how they can contribute. Through information websites and easy-to-use calculators, consumers will have the tools they need to quantify the actions they are taking.

Sources of Emissions

Most of Canadians' greenhouse gas emissions – about half – come from transportation. The remainder comes from heating and cooling homes, hot water, appliances and lighting.

Sources of Personal GHG Emissions in Canada



Emissions arising from electricity use vary depending on where people live. Some provinces, such as Nova Scotia, Saskatchewan and Alberta, generate most of their electricity from coal, which is emissions-intensive. Other provinces, such as Quebec, British Columbia and Manitoba, generate most of their electricity from hydro, which has very low emissions. Reducing electricity use in these provinces will not have as significant an impact on overall emissions reductions, but it could create excess electricity that these provinces can sell to other markets, displacing coal-generated electricity.

Achieving the One-Tonne Goal: Practical Tips

What follows are some specific examples of steps individual Canadians can take to achieve their goal. Many of these steps are supported by measures outlined in Section III.

On the Road

Transportation accounts for half of individual greenhouse gas emissions. The kind of vehicle and the number of kilometres driven can have a huge impact on greenhouse gas emissions. Canadians can take many actions to reduce emissions from transportation.

- **Buy a fuel-efficient vehicle** – A 25 percent more fuel-efficient vehicle could reduce emissions by more than one tonne per year and save $360 on an average annual gasoline bill of $1440.
- **Use ethanol blend gasoline** – Current vehicles can use up to 10 percent ethanol blended gasoline without any adjustment to or effect on the engine.
- **Use the car less** – Driving 10 percent less, by walking, cycling, carpooling or taking public transit, can reduce greenhouse gas emissions by 0.2 to 0.8 tonnes per year, depending on the vehicle.
- **Reduce idling** – If every Canadian motorist avoided idling their vehicles for just five minutes a day, all year, more than 1.6 million tonnes of carbon dioxide, along with other toxic substances, would not enter the air.

At Home

The average Canadian home produces six and a half tonnes of carbon dioxide every year. Space heating uses the largest amount of energy, so actions that reduce home heating requirements will have the greatest impact.

- **Retrofit older homes** – Homeowners can save an average of 25 percent per year on their energy bills by implementing the recommendations of an EnerGuide for Houses evaluation and reduce household emissions by more than 2 tonnes per year, depending on the type of home.
- **Buy an R2000 home** – An R2000 home uses 30 percent less energy than conventional new housing and can save 1-2 tonnes of greenhouse gas emissions per year. These homes also help save on annual heating and cooling bills and are more comfortable and healthier for living.
- **Be energy efficient at home** – Trim home heating bills by up to 10 percent and reduce emissions by up to 0.5 tonnes, by lowering the thermostat at night and when the house is unoccupied.
- **Replace appliances with more energy-efficient models** – A 2002 ENERGY STAR®-labelled refrigerator uses less than half the electricity of a 10 year old model, saving more than $40 per year on a home energy bill and reducing emissions by more than 0.2 tonnes.

At Work

Canadians can also help to reduce greenhouse gas emissions by taking action in the workplace. These actions complement actions at home and on the road and contribute to reducing emissions in commercial and institutional buildings.

- **Use computer equipment wisely** – Computers and monitors account for approximately 7 percent of electricity consumption in a typical office. Reduce energy consumption and greenhouse gas emissions by enabling the monitor's energy saving features during the day, and turning the computer off every night.

- **Purchase more energy-efficient printers, computers, and photocopiers** – ENERGY STAR®-labelled printers and photocopiers switch to 'sleep mode' after a preset period of inactivity, use about 50 percent less energy and generate less heat, thereby reducing cooling costs.

B. Community-Level Action

In Canada, sustainable community development is catching on. Municipal governments are taking actions to reduce greenhouse gases, both in their own operations and in the community at large. They are doing this to obtain the myriad of co-benefits that come from greenhouse gas reduction – cost savings, local economic development, improved local air quality and the health benefits that result, and improvement in the quality of life for their citizenry. Municipalities are encouraging alternative forms of transportation, curbing urban sprawl, protecting and enhancing urban green space, using renewable forms of energy and performing energy efficiency retrofits on buildings. With 80 percent of Canadians living in cities, municipalities have a vital role to play in tackling climate change.

The City of Calgary, for example, is purchasing 21 gigawatt hours of wind-generated electricity every year to power the city's light-rail transit system. Calgary also uses solar energy to heat its municipal bus garages.

In Montreal, commuters are riding 155 biodiesel buses. The $1.3 million BIOBUS project will help assess the environmental, economic and social advantages of using biodiesel in Canada. The result could be a new, less-polluting fuel and new opportunities for farmers.

In Halifax, an innovative strategy has been put in place for the on-site separation of wet, dry and recyclable waste at both residential and business sources. Operational since January 1999, the Halifax approach has diverted 43 percent of the waste that would normally have gone to landfill and reduced greenhouse gas emissions (mostly methane) by approximately 1.4 tonnes per resident based on the volume of organic materials diverted from the landfill.

From major cities like Toronto, Ottawa and Vancouver, to regional centres such as Sudbury and Windsor, to remote communities such as Fort McPherson and Oujé-Bougoumou, district or community energy systems are meeting heating, cooling and other energy needs in a more efficient manner. These systems use a central plant to meet the energy needs of buildings within a specific urban cluster, providing environment-friendly energy and substantial savings.

Budget 2000 established a number of new initiatives by the Government of Canada to assist Canadians and their communities in addressing climate change, including the Green Municipal Funds, expanded purchases of "green" power and renewal of the Climate Change Action Fund, and energy efficiency and renewable energy programs.

Partners for Climate Protection (PCP) is a partnership between the Federation of Canadian Municipalities (FCM) and the International Council for Local Environmental Initiatives (ICLEI). It works to bring Canadian municipal governments together in efforts to improve environmental performance and quality of life by reducing greenhouse gas emissions from their operations and their communities as a whole. Under the initiative, communities set ambitious emissions reduction targets, develop action plans and monitor progress. PCP has been extremely successful, with 100 communities signed up across the country, including every capital in Canada. PCP communities represent nearly 50 percent of the Canadian population.

In addition, the Green Municipal Enabling Fund and the Green Municipal Investment Fund, managed by the FCM, have proven effective in stimulating community-based projects that reduce greenhouse gas emissions across Canada. The Green Municipal Enabling Fund supports communities in developing their own

innovation and climate change plans. No one knows better than communities themselves the particular strengths they have to offer and how they would like to develop in the future. By facilitating local level engagement, communities can secure buy-in from their industry, institutions and residents on the kind of community in which they want to live, invest and grow.

The FCM believes that these initiatives will help Canada's municipalities reduce emissions by a further 10 MT over the next 10 years.

C. Aboriginal and Northern Communities

Aboriginal and northern communities face unique challenges. Mounting scientific evidence suggests that climate change may have a disproportionate impact on Canada's North, especially the western Arctic, which is experiencing some of the highest rates of ecosystem warming in the world.

The livelihood of many Aboriginal and northern residents comes from the land, water and natural resources, and will be compromised as ecosystems and wildlife are affected by climate change over time. In the north, melting permafrost could put buildings, pipelines, roads and other infrastructure at risk. Winter roads to remote Aboriginal communities may no longer be available or available only for shorter periods, thereby increasing the cost of supplying these communities.

Aboriginal peoples and northerners are already taking steps to reduce greenhouse gas emissions and to implement energy efficiency measures. At the same time, given the considerable potential for oil and gas as well as mining development and forestry, emphasis is also being placed on economic development and job creation.

It is essential that Aboriginal peoples and northerners have the tools they need to respond effectively to climate change through, for example, the promotion of alternative energy sources and the implementation of energy efficiency initiatives.

Governments are already collaborating in support of these objectives. The Canada-Yukon Energy Solutions initiative, for example, coordinates federal and territorial programs related to energy efficiency. In the Northwest Territories, the Arctic Energy Alliance acts as a service and program delivery agency. The Government of the Northwest Territories also encourages energy efficiency through its Building Operator Training Program.

Ongoing efforts will be required to ensure that Aboriginal and northern perspectives are incorporated into our national climate change strategy. The Aboriginal and Northern Climate Change Program has begun to address these priorities by funding community-based awareness and by building capacity to respond to climate change, encourage the use of renewable energy and address energy efficiency challenges, while seeking opportunities for Aboriginal participation in national and international initiatives.

The Partnership Fund will allow for funding new initiatives from Aboriginal and northern communities.

D. Leadership by Governments

Governments at all levels are consumers too, and all are taking action to reduce greenhouse gas emissions through the choices they make in their day-to-day operations. Some examples of provincial, territorial, municipal and federal actions are highlighted here.

Alberta has proposed completing energy retrofits in 190 government facilities, comprising 60 percent of the building space managed by government, installing cogeneration (combined power and heating from natural gas) units at government-funded research facilities, purchasing or leasing 100 new alternative fuel or hybrid vehicles for the government fleet over the next three years and ensuring new government

buildings and government-funded buildings are built to energy efficiency standards that exceed those of the Model National Energy Code for Buildings.

Nova Scotia's Leadership by Example initiative is developing a Provincial Buildings Initiative, with a view to realizing energy savings of 20 to 30 percent.

Manitoba's ethanol-blended gasoline purchase policy calls for all Manitoba government departments to purchase ethanol-blended fuel where it is reasonably available. A province-wide policy that will result in 10 percent ethanol in all gasoline used in vehicles is under consideration.

Perth, Ontario, is implementing its ecoPerth program with a target of reducing its greenhouse gas emissions by 20 percent by 2010. The City of Edmonton, Alberta, has adopted a greenhouse gas Emissions Reduction Plan for City Operations, which targets an annual reduction of 37,000 tonnes of CO_2 emissions from city services and facilities by 2008.

For its part, the Government of Canada has put in place its Federal House in Order program, under which the 11 largest-emitting departments and agencies will cut their emissions to 31 percent below 1990 levels by 2010. To date, participating departments have succeeded in reducing emissions by 21 percent. With this progress, and eight years remaining, we expect to be able to exceed our target and will be working to ensure this is the case.

In keeping with the proposed target in the Buildings section of the Plan, the Government will build all its new facilities to a minimum standard that is 25 percent better than the existing Model National Energy Code for Buildings and federal housing units will be constructed to meet the R2000 standard or equivalent. The Government will take advantage of opportunities to showcase best practices in greening the built environment and energy efficiency when undertaking projects in the Parliamentary Precinct. It is often the case that, through careful initial design, much more efficient and livable buildings can be constructed at no greater cost over the life cycle of the building. We will work to make such best practices become the norm for government construction.

The Government has already begun to retrofit existing government buildings to improve energy efficiency, financed through energy cost savings. To date, we have addressed 7,000 buildings with savings of $24 million/year on our energy bills. For our major commercial buildings we will work towards retrofitting a further 20 percent. In government housing we will work towards the 20 percent retrofit target proposed for the country. In addition, the Government is considering how to strengthen energy efficiency requirements in major buildings it occupies under long-term leases.

In addition, all of the goods and equipment purchased for federal operations will meet the energy-efficient ENERGY STAR® standard through the incorporation of explicit specifications in all relevant purchasing decisions.

The proportion of lower-emitting vehicles in the federal fleet will also be increased as a challenge to other government and commercial fleets. Beginning with orders for 2004 model vehicles, the level of greenhouse gas emissions will be added to cost and fuel consumption as a mandatory criterion when making vehicle-purchasing decisions.

Under Action Plan 2000, the Government of Canada is moving to purchase 20 percent of its electricity requirements from renewable sources.

Because emerging energy technologies face significant market barriers, the Government will consider becoming a first purchaser of next generation power technologies and energy sources such as fuel cells and hydrogen, as well as other key enabling technologies such as advanced batteries and high-voltage electronics.

Last year, the Government of Canada's report under VCR Inc. attained gold-level status. We are participating in VCR Inc.'s initiative to develop even more rigorous reporting standards and intend to meet that new standard when it is implemented.

V. Improving Our Understanding of Climate Change and Preparing to Adapt

Since 1997, a great deal of work has been done to further our understanding of the state of Canada's climate, the sources of greenhouse gases and how they are absorbed in nature, the potential impacts of climate change and Canada's capacity to adapt. However, in order to make the most appropriate decisions on adaptation and future emissions reductions (post-Kyoto), additional information, based on further research, will be required.

A. Improving Climate Science

Understanding the climate system is a key scientific challenge in the international effort to address climate change. Given the magnitude of this challenge, early investments have been made, focused on urgent policy needs such as carbon sinks and filling some of the gaps in climate observation. As a result of these investments, Canada has developed a significant capacity and reputation in climate change science. To build on these efforts, four priority areas for further action have been identified:

Addressing climate model uncertainties

Because climate change is a long-term issue, there is a need to better understand projected changes over the next 20 to 30 years. **Working collaboratively, Canadian government and university scientists could improve basic science studies and numerical models, giving greater precision to predictions about the rate and magnitude of climate warming.**

Provision of regional-scale climate change information

Global climate models have given us the big picture as to what future climate change will look like. Regional climate models could provide more detail as to where changes are likely to be most dramatic. These regional models, together with the broader modelling, will enhance seasonal climate forecasting and provide useful information for the purposes of adaptation in specific sectors such as agriculture and fisheries. **Further work is required to continue the development of a regional-scale model for Canada, in collaboration with the university community.**

Future evolution of climate in the Arctic

The Arctic is particularly sensitive to changes in climate. Arctic sea ice, for example, is expected to continue to decline. As noted, not only will this affect the global climate system, but there will be significant impacts on the environment, well-being and lives of the peoples of the circumpolar region, including Canada's North. The climatic processes that cause the decline in sea ice are not, however, fully understood. **A sustained international effort to improve our ability to project the future evolution of the Arctic sea ice is needed, and Canada would be expected to play a lead role in such a project.**

Determining the record of past climate variability and extremes

Additional research on the past climate record could provide more detail on the variability of Canada's climate, particularly in regions such as the Great Lakes and the Prairies. Partnerships with universities and the private sector could be strengthened and existing expertise and networks enhanced, with appropriate mechanisms to coordinate and set research priorities.

B. Assessing Climate Change Impacts and Preparing to Adapt

Due to past and current global greenhouse gas emissions, some adaptation to climate change will be required regardless of the success of actions to reduce emissions. Even if rapid and sustained emissions reductions are achieved, the impacts of climate change will continue to be felt for many decades and adaptation actions will be required.

Canada's climate change impacts and adaptation actions to date have engaged new researchers and stakeholders and started the process of building capacity in this relatively new, cross-cutting field. Canadian research on impacts and adaptation carried out since 1997 is being synthesized into a comprehensive report, with final publication due in 2003.

In addition, federal, provincial and territorial governments have supported the creation of the Canadian Climate Impact and Adaptation Research Network to link researchers and stakeholders. Two new research groups, OURANOS in Quebec and the Prairie Adaptation Research Collaborative (PARC), have been created to enhance research.

This Plan proposes that the collaboration among governments, academics and the private sector continue in order to advance readiness to adapt in four key areas:

- develop and research approaches to adaptation planning and tool development;
- expand assessment of vulnerabilities to climate change impacts to all areas of Canada, including the North and natural resources sectors;
- identify priority areas/regions where there is a need to consider future actions; and
- develop increased awareness of the impacts of climate change and the need to address them in the future through adaptation.

As we go forward, this Plan will be adjusted and improved to reflect changing circumstances. Further effort will also be required to enhance public awareness of climate change, and the actions required to adapt to it.

VI. Accountability

As noted, the Plan will evolve in the years ahead. We need to remain flexible enough to adjust to new circumstances, to respond to changes in market conditions and to capitalize on opportunities provided by the introduction of new technologies and innovation. We also need to take account of progress or difficulties as initiatives are implemented.

Underpinning global agreements, such as the United Nations Framework Convention on Climate Change and the Kyoto Protocol, are accountability mechanisms designed to ensure that Parties fulfil their obligations.

We will continue to meet our reporting obligations. In order to participate in the Kyoto Mechanisms, Canada will be required to comply with a variety of international monitoring, reporting and review requirements, such as the annual compilation and reporting of emissions inventories and the creation of a registry to rigorously track Canada's assigned amount of emissions permits. These requirements are essential to maintaining the environmental integrity of the Kyoto Mechanisms, and we will meet them fully.

Ontario already requires mandatory reporting of greenhouse gas emissions and Alberta is moving towards this as well. The Government of Canada is considering a nation-wide facility-based reporting system.

Working with other orders of government, industry and other partners, we will monitor both the economic and environmental effectiveness of the Plan's initiatives. This collaborative effort will help ensure that we strengthen initiatives and adjust our course where necessary. The continuous feedback from monitoring will enable us to keep the Plan "evergreen", to respond as necessary in the event of unwanted economic effects and to ensure that Canada meets its Kyoto target.

We will monitor emissions reductions from specific initiatives to see whether they are meeting program goals. Emissions reductions from specific measures must be measurable and verifiable. Measures not meeting expectations will be redesigned or reassessed. Areas that are exceeding expectations may see increased investment and effort. A variety of performance measurements will be designed to reflect the different sources of emissions and initiatives to reduce them. These performance measurements will be an important tool for projecting our emissions track and providing the time to adjust.

As part of recent federal investments to address climate change, two tools have been developed that will serve us well over the coming years.

The first of these is the Technology Early Action Measures (TEAM) program, which has developed a System of Measurement and Reporting. This system tracks the technical and greenhouse gas performance of projects such as fuel cell and biodiesel technologies.

The second is the Greenhouse Gas Verification Centre at Environment Canada, which will spearhead efforts to develop consistent standards, protocols and methodologies for calculating, measuring and verifying greenhouse gas emissions reductions, in collaboration with the Standards Council of Canada. It will also provide an information clearinghouse on these tools that can be used by all parties involved in emissions reduction activities.

We are making the investments now in measurement and verification technologies that will enable us to comply with the monitoring, reporting and review obligations under the Kyoto Protocol. In collaboration with provincial and territorial governments, we will invest in the database and methodologies necessary for the accurate and timely measurement of our forest and agricultural sinks.

We will be rigorous in ensuring that Canadians are informed of our progress. Bi-annual reports will be made to the public, outlining the Plan's successes and describing its evolution as it is adjusted to meet new challenges. The first comprehensive Government of Canada report on the results of climate change efforts to date will be available next year.

VII. Conclusion

The Plan presented in these pages is a comprehensive approach to meeting our commitments under the Kyoto Protocol.

It recognizes that climate change is a global problem requiring a global response and that the Kyoto Protocol provides the opportunity for concerted international action.

It also recognizes that each of us has a role to play and a responsibility to assume – that everyone must be involved in this national project. While there will be economic impacts associated with achieving our climate change goals, these are expected to be manageable, as outlined in the annex that follows.

At the same time, addressing climate change opens up exciting new opportunities – to become a more innovative economy, to establish Canada as a leader in the field of environmental technology, to develop a competitive advantage in the knowledge economy and to contribute to a better quality of life for all Canadians.

As the world makes the transition to a less carbon-intensive economy, those nations that lead this transition can reap enormous benefits. Canada must be among the leaders.

In the past, we have seen the private sector succeed in addressing environmental issues such as reducing ozone-depleting chlorofluorocarbons and acid rain. In each case, the challenge was met with creativity and costs were transformed into competitive advantages. We are confident that the same capacity for innovation will be brought to bear in addressing climate change.

The Plan sets out a clear goal and proposes a path to take us there. But it is also built on a diversity of approaches, including a Partnership Fund, emissions trading and targeted measures, to minimize costs while meeting our commitment that no region should bear an unreasonable burden.

It is also a Plan that remains open to adjustment – one that can adapt to changing circumstances. This is crucial, because we cannot predict with precision the course technology will take or the opportunities innovation will provide.

Above all, it is a Plan made in Canada for Canadians, allowing us to pursue our own objectives in our own way. It reflects Canadian values and advances Canadian interests.

Going forward, we look forward to working with our provincial and territorial partners, as well as with industry and other interested parties, on the best means of implementing the Plan.

By applying our energy and imagination to the task at hand, we can enrich our lives, enhance our economy and expand our opportunities. We have much to gain, and little time to lose.

ANNEX: Analysis and Modelling of Cost Impacts

Analysis and modelling has provided critical support to the ongoing development of Canada's climate change policy. It has been used to produce integrated evaluations of the economic implications of various policy options to achieve Canada's Kyoto target. These evaluations have highlighted issues, which have, in turn, suggested extensions or alternatives to the policy proposals being developed.

This annex has several related objectives. The first is to provide a summary of the modelling and analysis activity since the negotiation of the Kyoto Protocol. The second is to describe the analytic framework developed to evaluate policy options. The third objective is to review and interpret the results of the most recent round of modelling. This recent work, undertaken by the Government of Canada, focused on the assessment of the so-called Reference Policy Package (RPP). The RPP broadly reflects federal thinking on the appropriate mix of policy instruments. It can perhaps best be interpreted as a variation of option 4 in the May 2002 *Discussion Paper on Canada's Contribution to Addressing Climate Change*.

I: Previous Analysis

In April 1998, federal, provincial and territorial energy and environment ministers (referred to as Joint Ministers) launched the National Climate Change Process (NCCP), a wide-ranging examination into the feasibility and implications of Canada's Kyoto Protocol target. In addition to creating a number of specialized Issue Tables, ministers underscored the importance of rigorous economic analysis by establishing the Analysis and Modelling Group (AMG), a federal-provincial-territorial working group of economists. The primary responsibility of the AMG was to provide an integrated assessment of the economic implications for Canada of various policy options to achieve the Kyoto target. The options themselves were suggested either by the Issue Tables or, more recently, by other working groups established to investigate specific policy alternatives.

The work of the AMG can be broadly divided into two phases. In the first phase, culminating in the October 2000 Joint Ministers' Meeting and the subsequent release of the AMG's report[1], the focus was on "range finding" – providing guidance to policy makers on the order of magnitude of some of the fundamental issues related to the achievement of the Kyoto target. In effect, the AMG was testing very broad policy approaches within a framework of different assumptions about the international dimensions of Kyoto, using a variety of modelling structures. The large number of combinations examined reflected, in large part, the many uncertainties associated with the Protocol at that time.

The AMG's range finding provided a number of useful insights for policy development. Perhaps the most important was to establish that the overall economic impact, across a large number of policy approaches, external assumptions and models, was in the range of 0 to -3 percent of gross domestic product (GDP) in 2010. This result, which suggests that, at most, the economy could be 3 percent smaller in 2010 as a consequence of achieving our climate change target than it otherwise would be, indicated an economic cost which, while of concern, was manageable. Other important findings from the first phase of analysis are as follows:

- the international carbon price is an important determinant of economic impact;
- approaches requiring each sector to achieve the same percentage target impose significant economic costs;

[1] Analysis and Modelling Group. *An Assessment of the Economic and Environmental Implications for Canada of the Kyoto Protocol*. National Climate Change Process, November 2000.

- most of the general approaches, particularly those that rely heavily on energy price increases to reduce GHG emissions via reduced fossil fuel use, result in considerable variability in impact across industries and provinces;
- emissions trading holds considerable promise as a cost-effective means of achieving emissions reductions; and
- agricultural and forest sinks are important to lower the overall cost of achieving the Kyoto target.

The second phase of AMG analysis began after the Bonn and Marrakech negotiations in late 2001. By establishing the rules regarding Kyoto Mechanisms and a framework for agricultural and forest sinks, these negotiations provided greater certainty as to the nature of the international "contract". It was also clear, following President Bush's announcement in March 2001, that the United States would not ratify the Protocol.

With the above issues clarified, it became possible to analyse policy options within a more informed set of external assumptions. The second phase of analysis was, therefore, largely focused on policy packages differentiated primarily by their reliance on, and approaches to, domestic emissions trading (DET). Emissions sources not covered by DET were addressed through initiatives such as incentives, regulations or information programs, which are referred to as "targeted measures". The analysis centered on two cases:

- A "broad as practical" emissions trading system, in which permits are auctioned by government and the revenues returned, via reduced personal income taxes, to consumers.
- An emissions trading system covering the large industrial emitters in the electricity generation, oil and gas production, and energy-intensive industries in which available permits are allocated free according to output growth. Specific targeted measures – about forty in total – are applied to the sectors not covered by the DET system (transportation, buildings, small industry and agriculture). The direct and indirect government costs are financed by raising personal income taxes.

These cases became, respectively, options 1 and 3 in the Government of Canada's Discussion Paper on Climate Change released in May 2002. The results were presented at the May 2002 Joint Ministers' Meeting and provided the basis for the stakeholder consultations in June of this year.

The results of the second phase of modelling provided many useful insights for policy development. Among the most important:

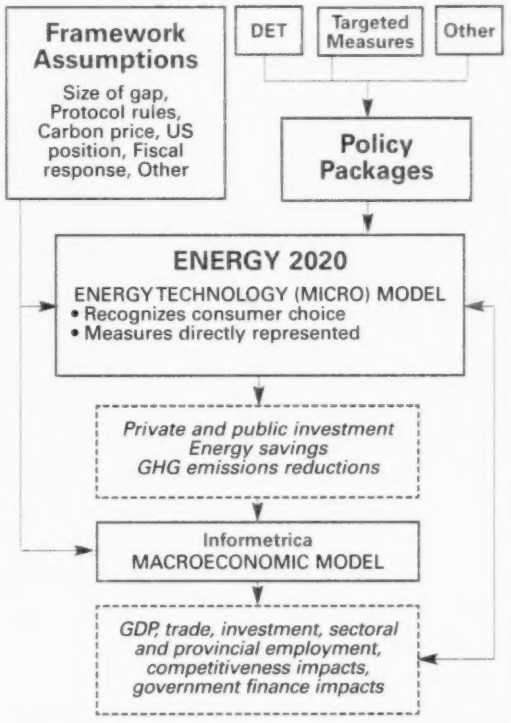
- Overall, the impact ranges from a slight positive effect on GDP under option 1 to -0.7 to -2.0 percent of GDP (in 2010) for option 3.
- Part of the difference is explained by different assumptions regarding international carbon prices (the analysis was carried out using two alternate price assumptions: $10 and $50 per tonne of CO_2). While the majority of expert opinion suggests a price near the lower end of the range, given the uncertainty on this matter, a range of prices was examined as prudent risk management.
- Most of the difference is related to the impact of the income tax changes (reduced in option 1, increased in option 3) to offset the impacts of the policy packages on the fiscal balances of governments. This fiscal assumption, although it has no direct bearing on emissions reductions, is a very important determinant of the economic outcome.
- The "broad as practical" emissions trading approach (option 1), although favourable overall, generates considerable variation in industrial and provincial as well as territorial impacts, largely because of its heavy reliance on energy price increases to achieve the emissions reductions.
- The large final emitter option (option 3) goes some way to address the competitiveness issues of manufacturing industries but needs further refinement (i.e., changes to measures that were modeled and/or new measures to moderate the impacts on oil and gas producers and electricity generators).
- Partly because of the effects on energy producers, option 3 results in somewhat larger negative impacts on Alberta, Saskatchewan and Newfoundland than on other provincial and territorial economies. The relative impacts are larger under higher permit prices.

These insights, along with the feedback from the stakeholder consultations, greatly assisted federal officials in developing a more articulated version of option 4, which had only been sketched out in the Discussion Paper. This articulated version is the Reference Policy Package (RPP) described more fully in Section III of this annex.

II: The Analytic Approach

The analytic framework is portrayed in Chart 1. Essentially it is comprised of three major components: a proposed policy package, a set of framework assumptions and a modelling structure.

Chart 1: The Analytic Approach



Policy Packages

A policy package consists of a set of suggested government initiatives to reduce GHG emissions. A typical package contains some combination of an emissions trading system and a suite of targeted measures – information programs, regulations, mandates, incentives, partnerships, etc. – designed to achieve emissions reductions in specific sectors. Another possible element in the mix includes offsets (investments in emissions reductions outside the emissions trading system).

It should be emphasized that the models do not determine the policy package. The package is developed by analysts and senior officials who typically rely on expert advice on specific sectors. It is the role of the modelling to assess the overall impact of the package when all its components are allowed to interact with each other and with the broader economy. The modelling results are then used to inform and shape climate change policy and the Plan.

Framework Assumptions

The second major component of the analytic approach is the framework assumptions. Typically, these are either starting point assumptions or parameters that influence the results.

The most important starting point assumption is the "business as usual" (BAU) outlook, which projects emissions growth in the absence of additional policy initiatives. The difference, typically measured in 2010, between this BAU projection and the target Canada took on under the Kyoto Protocol (6 percent below 1990 levels) is the "gap" – a measure of the challenge facing Canada in achieving its Kyoto target. Based on a systematic review by the AMG earlier this year, the BAU projection for 2010 is 810 megatonnes (MT). Given our Kyoto target of 571 MT, the gap is currently estimated to be approximately 240 MT. In other words, in order to achieve its Kyoto target, Canada would have to reduce emissions in 2010, through a combination of domestic and international action, by about 30 percent from what they otherwise would have been.

One important contribution to reducing the gap is to recognize the contribution of forest and agricultural sinks from current practices (i.e., those sinks that would be created under the BAU projection). Based on analysis by the Canadian Forest Service and Agriculture and Agri-Food Canada (AAFC), the current analysis assumes 30 MT of sinks from current practices (20 MT from forests and 10 MT from agricultural soil management). Both the forestry and agricultural sinks are deducted from the national total for emissions.

Two other key assumptions influencing the results of a given policy package are the international carbon price and the way in which the government finances the policy package.

By removing the largest potential purchaser from the international permit market, the United States decision not to ratify the Protocol reduces the likely international carbon price. However, given the many uncertainties surrounding this embryonic market, policy options should be evaluated across a range of international carbon prices. Based on a workshop featuring international experts organized by the AMG in November 2001, the range selected for analytical purposes is CDN$10 to CDN$50 per tonne of CO_2. As noted, a subsequent review of international modelling results, expert opinion and other countries' views suggested that the balance of opinion favours a price near the low end of this range. Nonetheless, the Government of Canada believes that for prudent risk management the Reference Policy Package should be assessed under both prices.

For the financing assumption, the main issues are the most appropriate portrayal of the way in which governments fund large-scale initiatives and the likely fiscal situation over the period to 2012. To cover a range of possibilities, two financing assumptions were used in the analysis to finance the direct and indirect public costs of the RPP:

- Tax financed: all governments increase personal income taxes to maintain unchanged government balances.
- Government financed: the fiscal impacts of the policy package are allowed to directly affect government balances.

Alternative approaches, such as offsetting any fiscal impact by adjusting spending on existing programs, could also have been modeled but would require detailed assumptions as to which programs to change.

The government-financed rule results in reduced economic impacts because it avoids the negative effects of higher taxes. On the other hand, its application tends to slow the paying down of public debt. How the policy package is ultimately financed cannot be determined at this time. Future budgets will make the actual decisions as to how to finance the increased spending and accommodate reduced revenues.

The Modelling Structure

Due to the scope and complexity of emissions reduction policy, there is no one economic model that can adequately address all dimensions. To evaluate policy packages in a systematic fashion, the AMG linked a number of specialized private-sector models into an overall modelling structure. In this way, the outputs of one model can be used as inputs to a second.

As shown in Chart 1, the current modelling structure, which was constructed during the second phase of AMG analysis, relies on two models:

- ENERGY 2020, an energy-technology model of Canadian energy markets developed and operated by the Policy Assessment Corporation and the Canadian Energy Research Institute (CERI).
- The Informetrica Model (TIM), a macro-econometric model of the Canadian economy developed by the Ottawa-based consulting firm Informetrica Ltd.

Both of these models are highly regarded, are based on a solid understanding of economic relationships and have been employed by numerous governments and stakeholders to provide economic analysis of public policy issues. Further, both models have been extensively reviewed by stakeholders through the AMG consultations. Finally, both offer a highly disaggregated structure, which permits examination of impacts at a relatively detailed industrial and provincial level.

As can be seen in Chart 1, the analysis process operates by first modelling the policy package in ENERGY 2020. The principal outputs from this model

are estimates of the private and public investment, energy savings/change in energy mix permit transactions and emissions reductions associated with the policy package. The investment, energy savings and permit transactions then become inputs to the TIM model which estimates the impact on GDP, employment, trade, government finance and other measures of economic performance. The impacts of output, employment and investment changes are fully diffused across energy markets and the economy via a feedback mechanism between the two models.

III: The Reference Policy Package – Description

In the May 2002 Discussion Paper, the Government of Canada suggested that option 4, the Adjusted Mixed Approach, could form the basis for a workable approach to meeting Canada's Kyoto target. The consultations supported further examination of this option. Over the summer, federal officials developed a more articulated version of option 4, which also responded to some of the issues raised by the previous AMG modelling and to the views expressed during the stakeholder consultations. The result is the Reference Policy Package.

The RPP is not the Climate Change Plan for Canada described in this document. It is sufficiently similar, however, for its economic impacts to be viewed as broadly representative of approaches currently being discussed with industry and the provinces and territories.

The RPP is designed to achieve emissions reductions of 170-180 MT from the BAU projection in 2010 (i.e., similar in magnitude to the combination of Steps I and II in the Plan). It makes no assumption about how the balance of 60-70 MT to close the gap is achieved.

The RPP includes all the domestic measures announced in Action Plan 2000 and in the 2001 Budget. To achieve the remaining reductions, the package contains, in addition to the 30 MT of agricultural and forest sinks from current practices, three main components:

- a domestic emissions trading (DET) system for the use of large industrial emitters;
- about 40 additional targeted measures (some of which are enhancements of Action Plan 2000 measures); and
- a system of offsets.

To the extent that these measures are insufficient to achieve the required reductions, the RPP allows the Government to purchase international permits.

The three main components of the RPP are described below:

The DET System

The large industrial emitter emissions trading system applies to about 40 percent of emissions. It covers virtually all of the emissions from mining, iron and steel, pulp and paper, smelting and refining, industrial minerals, oil refining, pipelines and fossil-fuel electricity generation, emissions from about 70 percent of oil production and about 50 percent of those from natural gas production.

The BAU emissions from these large industrial emitters in 2010 are expected to be approximately 340 MT. The assumed overall target for the covered sectors in the RPP is about 260 MT, indicating an expected reduction of 80 MT from the DET sectors in this analysis (including the 25 MT expected to result from Action Plan 2000 and Budget 2001). This also means that about 75 percent of the overall permit requirement is provided free.

Within this overall target, permits are allocated free to each industry in a way that reflects emissions intensity, capacity to reduce emissions and forecast BAU output. Thus, subject to attaining the overall DET target, the number of permits allocated to each industry rises in proportion to its output. Through this output-based approach, industries are not exposed to the full cost of the additional permits required to match additional output. As a result, the output-based allocation approach goes a considerable distance in addressing the competitiveness concerns of fast-growing industries.

Targeted Measures

In addition to the Action Plan 2000 and Budget 2001 initiatives, the RPP includes about 40 measures designed to reduce emissions in the buildings, transportation, non-DET industry, oil and gas, and electricity sectors. These measures, which collectively are designed to achieve about 60-70 MT of emissions reductions, include regulations, incentives, information programs and partnerships. The most important targeted measures for each sector are:

Transportation: Incentives to accelerate vehicle scrappage, increase the use of biodiesel and other alternative fuels and improve truck technology, regulations and production incentives to increase the use of ethanol, and measures to expand urban transit

Buildings: New building codes for residential and commercial buildings, and for existing buildings, and incentives to retrofit 20 percent of all buildings

Industry not covered by DET: Extension of the Canadian Industry Program for Energy Conservation (CIPEC) program

Oil and Gas: Incentives to reduce fugitive emissions and to encourage CO_2 capture and storage

Electricity Generation: Incentives to expand the market for renewable sources and for cogeneration, and subsidy to CO_2 capture and storage demonstrations

Offsets

The RPP includes a proposal to encourage the agriculture, forestry and landfill gas sectors to invest in emissions reductions or sinks with the objective of selling the resulting credits to entities covered by the DET system. Based on previous analysis, it is suggested that about 20 MT of such offset credits could be generated annually at a price of $50 per tonne.

IV: The Reference Policy Package – Main Findings

The full set of results for the RPP is voluminous, covering 100-plus industries, a dozen fuel types and numerous representations of technologies, vehicles and building types for each provincial economy. This section provides only the main results.

Two points of orientation may be helpful. First, most of the results presented in the charts are differences relative to the BAU projection. Thus, a -1 percent for GDP in 2010 means that the economy in 2010 would be 1 percent smaller (in level, not growth rate terms) under the RPP than it would were the RPP not applied.

Second, to reflect some of the uncertainty surrounding key drivers of the results, all the charts provide estimates for the RPP under four carbon price/fiscal assumption scenarios:

- $10 carbon price – government financing
- $10 carbon price – tax financing
- $50 carbon price – government financing
- $50 carbon price – tax financing

The Government of Canada is of the view that the $10 carbon price-government financing scenario is the more likely. Accordingly, the estimates for this scenario are highlighted in the following charts.

Chart 2 provides a snapshot of the RPP impacts under the four scenarios for the year 2010 (the midpoint of the first compliance period). Three points deserve emphasis:

- In terms of the impact on GDP, the range is from -0.4 to -1.6 percent. Given that the economy is predicted to grow by 18 percent between 2002 and 2010 in the absence of taking climate change action in the federal-provincial-territorial AMG base case, growth over the period would be 17.6 percent under the more likely scenario and still be at least 16.4 percent (18.0 – 1.6) under any scenario.
- The projected impact on employment, although of concern, is not large. Approximately 1.32 million jobs are expected to be created over the period 2002-2010. The RPP would, according to this analysis, reduce that growth to 1.26 million in the more likely case and to 1.08 million in the least optimistic case. This means foregone employment growth (not job losses) of about 60,000 under the most likely scenario.

Chart 2: Comparison of Impacts under Four Scenarios – 2002

	Percent change in GDP relative to BAU in 2010	Employment Growth 2002 to 2010 (Millions of jobs)	Disposable income per household
BAU		**1.32**	**$68,000**
		$10 Case	
Government Financed	-0.4	1.26	$68,000
Tax Financed	-0.2	1.13	$66,700
		$50 Case	
Government Financed	-0.7	1.23	$67,800
Tax Financed	-1.6	1.08	$66,300

- Disposable income per household (the major determinant of consumer spending) is not affected in the government-financed scenarios. The reductions in the tax-financed scenarios are due primarily to the increases in personal income tax to maintain fiscal balances.

Charts 3 and 4 outline, respectively, the trends in GDP and employment impacts over time. The patterns across the four scenarios are essentially similar. The spike in 2003-2004 is largely related to increases in emissions-reducing machinery and equipment investment due to Action Plan 2000 and the additional targeted measures in the RPP (this result also suggests the need for care in staging the introduction of initiatives). The GDP and employment reductions for the $10 carbon price-government financing scenario are uniformly smaller than those for the other scenarios. The major difference in impact occurs between the tax- and government-financed scenarios, suggesting the significant role played by the fiscal assumption.

This role is highlighted in Chart 5. In the tax-financed scenarios, disposable income is significantly affected by the increases in personal income taxes to finance the RPP. In the government-financed scenarios, there are no tax increases. Therefore disposable income is essentially unaffected.

Chart 3: Reference Case GDP Impacts

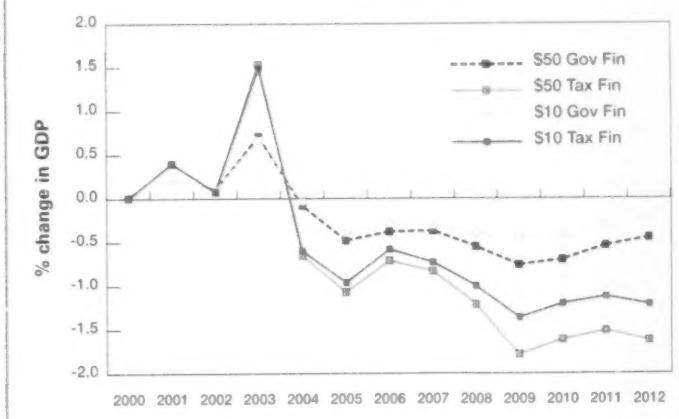


Chart 4: Reference Case Employment Impacts

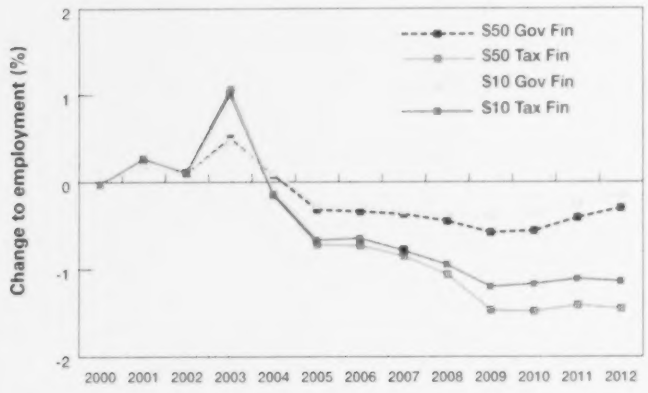


Chart 5: Reference Case Change to Disposable Income per Household

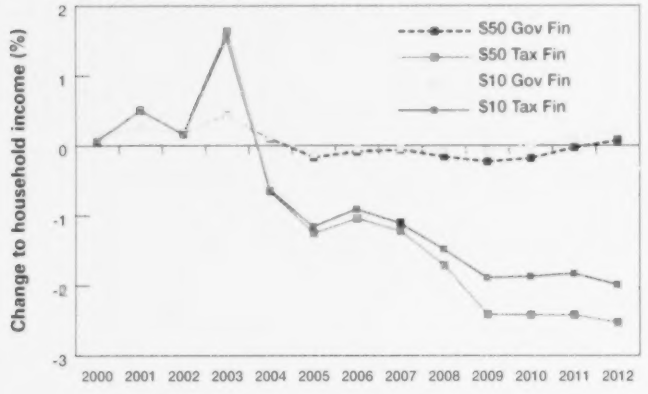


Chart 6 provides some results concerning the impact of the RPP on energy prices. With the exception of natural gas, energy prices are not greatly affected and are more or less insensitive to carbon prices or fiscal assumptions.

These results are due primarily to the design of the DET system, which applies the permit requirement on large industrial emitters rather than on the fossil fuels themselves. By contrast, other analyses that apply the permit system directly on fuels (i.e., on gasoline, heating oil, natural gas, etc.) typically show large price increases. The industries covered by DET only have a limited ability to pass on higher energy costs through higher prices. Moreover, output-based permit allocation significantly reduces the costs borne by such industries because about 75 percent of their permit requirements are issued free.

Other points of interest concerning energy prices include the following:

- Gasoline prices do not increase both because of the financial support for ethanol and because refiners, faced with higher costs, choose to supply more of the market through imports.
- Natural gas prices increase because both the producing industry and the pipelines are covered by the DET system and incur some costs that they can pass on. The absolute increase in natural gas prices is similar in all provinces. However, the percentage increase is much higher in Alberta than in Ontario because the base price is lower due to the short pipeline distance.
- Electricity prices generally fall modestly in all regions. The reason for this result is primarily that there are many measures in the RPP focused on improving energy efficiency in other sectors. This improved efficiency serves to reduce electricity consumption in residential, commercial and industrial applications.

Chart 7 focuses on the industries covered by the DET system. These include the major energy-intensive industries and the energy supply industries (oil and gas, electricity and coal). Most of these industries are also very trade-sensitive. Also included in the list is motor vehicle manufacturing. This industry is not particularly energy-intensive, but it is trade-sensitive and can be significantly affected by measures directed at its products. The results suggest that the impact of the RPP on the motor vehicle industry is slightly positive because several of the urban transit measures directly stimulate vehicle demand. This also explains the slight stimulus to the steel industry.

The main message from all of these numbers is that the competitiveness issues of the heavy emitting industries appear to have largely been addressed by the design of the DET system. The impacts on output in all cases are relatively small, particularly so in the S10 scenarios.

Chart 6: Reference Case Energy Prices - 2010

	Percent change relative to BAU			
	$10 Tax Fin	$10 Gov't Fin	$50 Tax Fin	$50 Gov't Fin
Gasoline	0	0	0	0
Natural Gas				
Alberta	+8	+8	+46	+46
Ontario	+4	+4	+16	+16
Electricity				
Alberta	-7	-7	-2	-1
Ontario	-2	-2	0	0
Quebec	-10	-9	-7	-6

Chart 7: Reference Case Reduces Impacts on Energy Suppliers & Energy-Intensive Sectors

SECTOR	Percent share of GDP	$10 Tax Fin Change in output	$10 Gov't Fin Change in output	$50 Tax Fin Change in output	$50 Gov't Fin Change in output
Metal mining	0.7	-0.1	-0.2	-0.4	-0.4
Non-metal mining	0.2	-0.6	-0.6	-1.7	-0.9
Pulp & paper	1.0	+0.1	+0.2	-0.1	+0.1
Primary iron and steel	0.6	+0.6	+0.4	+0.4	+0.3
Primary non-ferrous metals	0.7	-0.3	-0.3	-0.6	-0.6
Motor vehicles	2.5	+0.9	+0.9	+0.9	+0.9
Cement and clay products	0.3	-2.6	-2.4	-3.2	-3.0
Refined petroleum	0.3	-4.2	-3.1	-5.1	-3.8
Industrial chemicals	0.4	-0.1	-0.3	-0.9	-1.0
Oil and Gas	2.7	-0.4	-0.4	-2.1	-2.1
Electricity	2.3	-3.2	-2.8	-4.5	-3.8
Coal	0.2	-0.9	-0.9	-4.9	-4.8

Chart 8: Reference Case Impacts on the Canadian Economy in 2010

SECTOR	Percent share of GDP	$10 Tax Fin Change in output	$10 Gov't Fin Change in output	$50 Tax Fin Change in output	$50 Gov't Fin Change in output
Energy suppliers	7.5	-2.1	-1.7	-3.6	-3.3
Energy-intensive and trade-sensitive sectors	6.7	+0.5	+0.5	+0.5	+0.6
Consumer goods & services	28.2	-1.2	-0.1	-1.6	-0.2
Construction	4.4	-3.8	-3.0	-4.7	-3.8
Transportation & storage	4.6	-1.0	-0.7	-2.2	-1.0
Communications	6.8	-1.4	+0.2	-2.9	0
Agriculture	2.0	-1.5	-0.8	-1.7	-0.7
Finance, insurance and real estate	15.5	-1.3	-0.5	-1.3	-0.5
Government & social services	14.3	-0.1	+0.1	-0.2	+0.1
Sub-Total	**88.0**	**-1.1**	**-0.4**	**-1.6**	**-0.6**

In these scenarios, the effects on the oil and gas industry are modest. Only in the $50 scenarios are the impacts on this industry discernible.

Among manufacturing industries, only cement and petroleum refining are significantly affected. For the former, the results reflect the particularly carbon-intensive production process. For petroleum refining, the relatively large impact relates to increased vehicle efficiency and the maintenance of imports at the expense of domestic production.

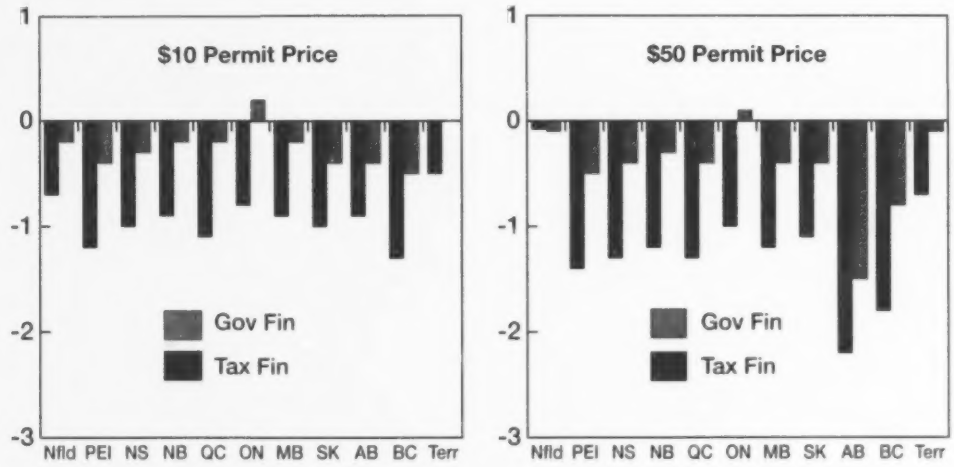
The industries on Chart 7 are very important to Canada's export performance and to investment. They account, however, for only about 15 percent of the economy. Chart 8 portrays the impact of the RPP on the other major sectors. The main differences in impact result from the fiscal assumption rather than the carbon price.

In the tax-financed scenarios, the requirement to raise income taxes to finance the policy and its consequences reduces disposable income and thus consumer demand. This, in turn, negatively affects industries dependent on consumer demand: consumer goods and services, communications, finance, insurance and real estate.

By contrast, this consumer effect is not present in the government-financed scenarios because taxes are not increased. Thus the more likely scenario is also one that minimizes the impact on consumers.

First Ministers agreed in 1997 that, under Canada's Kyoto policy, no region should bear an unreasonable burden. The impacts on provincial and territorial GDP, portrayed in Chart 9, suggest that the RPP comes close to attaining this objective. In the $10 government-financing scenario, the variation in impacts is quite small (-0.5 percent for BC to +0.1 percent for Ontario), a

Chart 9: Reference Case Provincial & Territorial Changes to GDP in 2010



difference that is not significant given the level of precision of such models. The slight positive for Ontario is due largely to the stimulus to the transportation equipment and steel industries from several of the measures. In the $10 tax-financed scenario, the impacts are both more negative and more uniform because of the slight depressing impact on consumer-oriented industries due to the tax increases. Only in the $50 scenarios do more significant variations in impact start to emerge. Alberta is more heavily impacted as a result of reduced oil and gas activity. For BC, the impact is a combination of several influences, in particular, a decline in trucking activity due in part to higher costs and reduced demand in the lumber and wood products industry, which in turn is caused by reduced construction activity. This impact on construction is an area where further analytical work is required to better understand the detailed sectoral results, especially as home and building retrofits will be a significant part of the Plan and the modelling does not forecast any decline in personal disposable income. Labour representatives have expressed a particular interest in participating in this analysis.

The results for other provinces and territories are close to the national average across the four scenarios.

V: Concluding Observations

The analytical approach used to estimate the economic impacts of the RPP is sound. Like all analytic undertakings of this scope, however, there remains considerable uncertainty – particularly regarding assumptions such as the international carbon price and the size of the gap. The modelling structure is well-regarded and has been vetted extensively by the provinces, territories and stakeholders.

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